THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

SEPTEMBER 1952

Limestone carrier John G. Munson

LOWER YOUR COST-PER-TON FOR CRUSHED STONE!

WILLIAMS *Heavy Duty* HAMMER MILLS

With a Williams, you don't need a primary crusher and another two or more secondary grinders — because *a single Williams Hammer Mill does the complete job in one operation!*

That means no additional machines are necessary — no extra foundations, housing, conveyors, drives or other equipment — *a saving up to 75% on initial investment!* And because a Williams does the job faster and better, you can *cut your crushing costs up to 50%!*

There's a Williams to suit *your* specific need, no matter what it is! It will pay you to *get the facts now!*

TYPICAL WILLIAMS HAMMER MILLS AND WHAT THEY CAN DO

SUPER-SLUGGER	Crushes power-shovel-loaded stone to $1\frac{1}{2}$", $\frac{3}{4}$" — even to 8 mesh — in one operation! Capacities up to 550 tons per hour.
SLUGGER	Reduces 100-pound stone to $1\frac{1}{2}$", $\frac{3}{4}$" or agstone — in one operation! Capacities up to 100 tons per hour.
NF and GA TYPES	Reduce 4" stone to $\frac{1}{2}$", agstone — or as fine as 20 mesh — in one operation! Capacities up to 200 tons per hour.

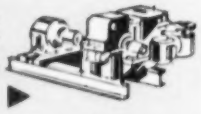
OTHER WILLIAMS EQUIPMENT

ROLLER MILLS
—IMPACT and DRYER MILLS
—for fine grinding to 400 mesh or micron sizes

AIR SEPARATORS
— any type; for precision control and high production in fine grinding

VIBRATING SCREENS
— in any size for any job. 1 to 3 decks, open or enclosed.

HELIX-SEAL MILLS
— for dust-free grinding, and for wet, sticky, greasy materials.



Also: COMPLETE "Packaged" PLANTS for crushing, grinding, separating.

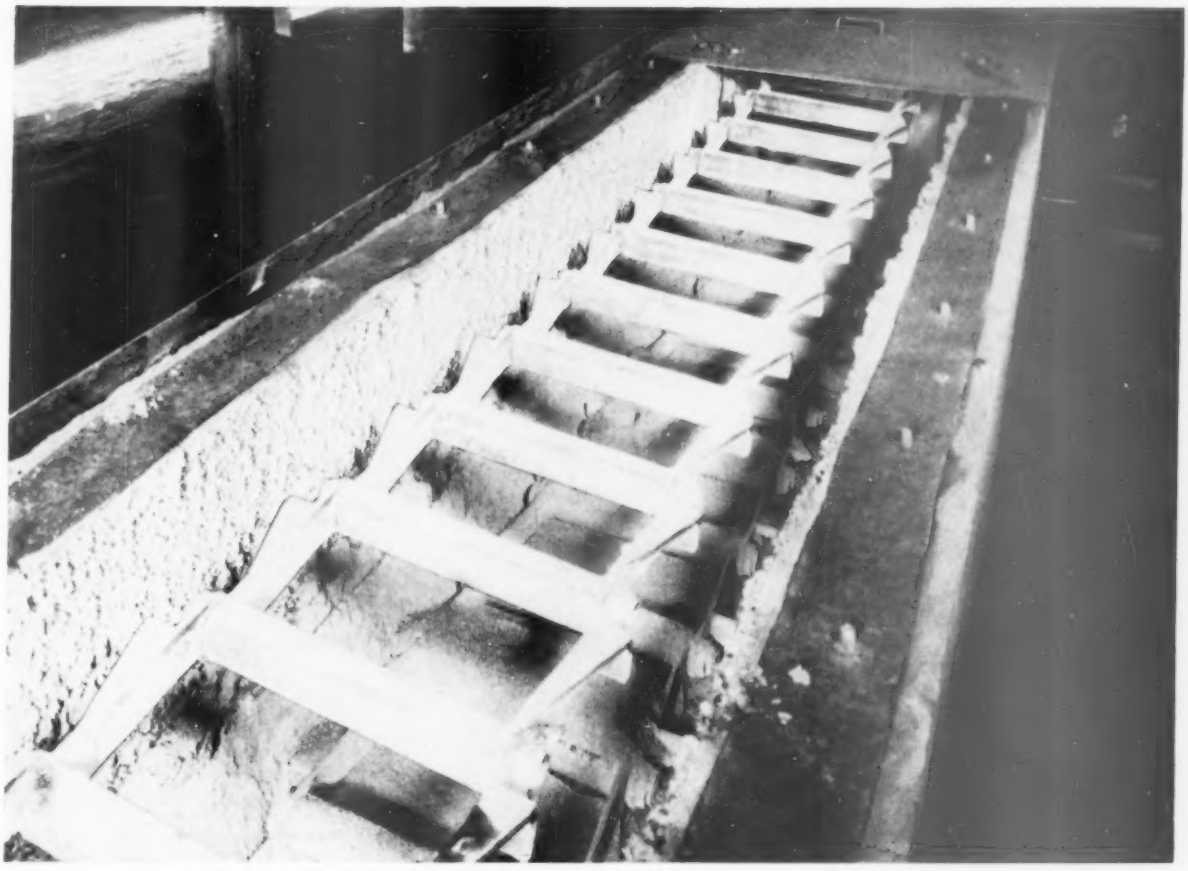
WILLIAMS PATENT CRUSHER AND PULVERIZER CO.
800 St. Louis Avenue — St. Louis 6, Mo.

WILLIAMS

CRUSHERS · GRINDERS · SHREDDERS

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

no ONE chain serves every purpose



Link-Belt Drag Chain Conveyor, employing a single strand of H-480 Promal chain, handling 150 tons per hour of ground limestone. Here the right chain for a specific job means more efficient performance, reduced operating costs.

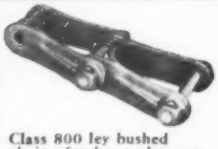
LINK-BELT offers the RIGHT chain for every job . . . engineered to meet your requirements

Typical chains from the complete Link-Belt line

Class SS bushed roller chain with straight sidebars —for practically any conveying or elevating service.

Class C combination chain — popular, durable, low cost design for elevators, conveyors.

Class SS bushed roller chain with offset sidebars —for heavy drive service at moderate speeds.



Class 800 ley bushed chain—for heavy duty, severely abrasive conveying and elevating.

Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets—we can recommend the best type to fit your particular requirements—cast, combination, forged and fabricated steel, roller or silent. So, whatever your chain problems, big or small, Link-Belt engineers will work with you or your consultants to help solve them.

LINK-BELT COMPANY, Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

12,542-E

LINK-BELT

CHAINS AND SPROCKETS

ROCK PRODUCTS

SEPTEMBER, 1952 THE INDUSTRY'S RECOGNIZED AUTHORITY VOL. 55, No. 9

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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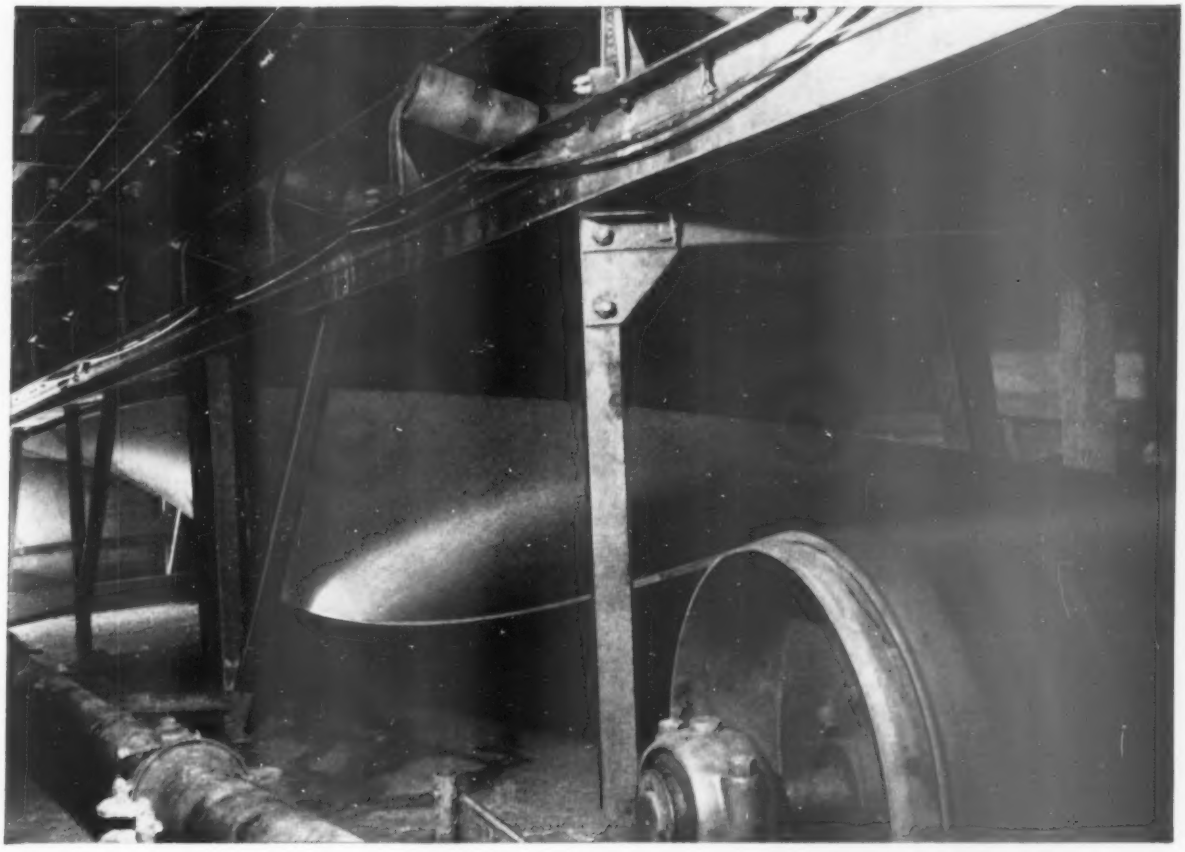
RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



New "Turnover" belt system announced by B. F. Goodrich

Carries sticky, freezing, or corrosive material without belt damage

OPERATING nearly half a mile underground, this conveyor belt carries iron ore through a long, narrow mine tunnel. But sticky ore, combined with mine dampness, would cause belts to wear out fast. Wet, sticky particles would cling to the cover, build up into gummy layers, soon clog the return idlers and pulleys, finally damage the belt cover.

Then, last year, a B. F. Goodrich "Turnover" belt system was installed, and for the first time a steady stream of iron poured out of this mine without any costly shutdowns for belt repairs.

You can see how this new conveyor system works. As the ore is dumped off the end of the moving belt, the belt makes a 180° turn, runs empty along the return idlers, then makes another one-half turn before receiving the next load.

Only the clean side of the belt touches the idlers, so there's no chance for sticky or corrosive materials to build up on them. Even wet materials can be handled at sub-zero temperatures without danger of belt freezing to the rotating metal parts.

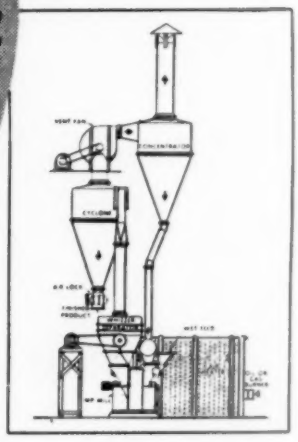
With the B. F. Goodrich "Turnover" belt, clean up of spillage is greatly reduced because any material that falls on the lower run of the belt is carried to the end and dumped off when the belt makes its turn. Damage to belt body is reduced because lumps of material cannot be trapped between the belt and pulleys.

Industry will find many other uses for the new B. F. Goodrich "Turnover" belt — in sugar refineries, fertilizer plants, limestone quarries — everywhere that sticky, freezing or corrosive materials must be moved from place to place. It's easy to convert any conventional system into the turnover type. Your local BFG distributor can show you how the "Turnover" belt can save you money, or write: *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.* (Available in Canada)

Conveyor Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

HANDLE THE COMPLETE JOB IN THIS SINGLE UNIT

1 PULVERIZING
2 CLASSIFYING
3 CONVEYING
4 DRYING



Raymond

WHIZZER EQUIPPED

IMP MILL

The Raymond Imp Mill combines pulverizing, separating, conveying and drying in one complete unit. This saves costly rehandling of materials, eliminates separate units of equipment, shortens process time, and provides a clean, dustless, automatic operation.

Whizzer separation gives a wide range of fineness control by one simple adjustment and it maintains a constant, uniform product. Flash Drying Accessories remove initial moisture simultaneously with pulverizing, and insure other further economies in handling materials that contain moisture in their crude state.

If you are making high specification materials, the Imp Mill offers important advantages in production. For further details of this versatile Imp Mill, write for Catalog #67.

COMBUSTION ENGINEERING – SUPERHEATER, INC.

1307 North Branch Street
Chicago 22, Illinois

Raymond
PULVERIZER DIVISION

Sales Offices in
Principal Cities

Here's the score:

"GUTS" is the way the owner sums up the record of the hard-driving "Caterpillar" Diesel D13000 Engine which powers this Bucyrus-Erie Shovel in a rock pit. Charles Guam, superintendent of Sam Braen Sons Co., Inc., Wyckoff, N. J., declares:

"This 'Cat' Engine works in hard rock in summer heat, winter cold and dust. In almost 3 years there has been no down-time. We have spent less than $1 on it in more than 4,000 hours. This D13000 Diesel has guts."

Little wonder that Sam Braen Sons is sold on other "Caterpillar" equipment. While the D13000 is working faultlessly in one pit, a "Cat" Diesel D318 Engine is the steady heart of a Lorain Shovel in another pit. The Lorain loads dirt for transfer to a former gravel pit where a "Caterpillar" D8 Tractor and 'Dozer are leveling land for building purposes.

High production by "Caterpillar" Diesels stems from unceasing devotion to small, important details. For instance, injection pumps and valves are protected from harmful materials in the fuel by filters. These fuel filters are made of high-quality, absorbent material wound upon an inner sleeve of the finest laboratory filter paper. Small details make the big difference.

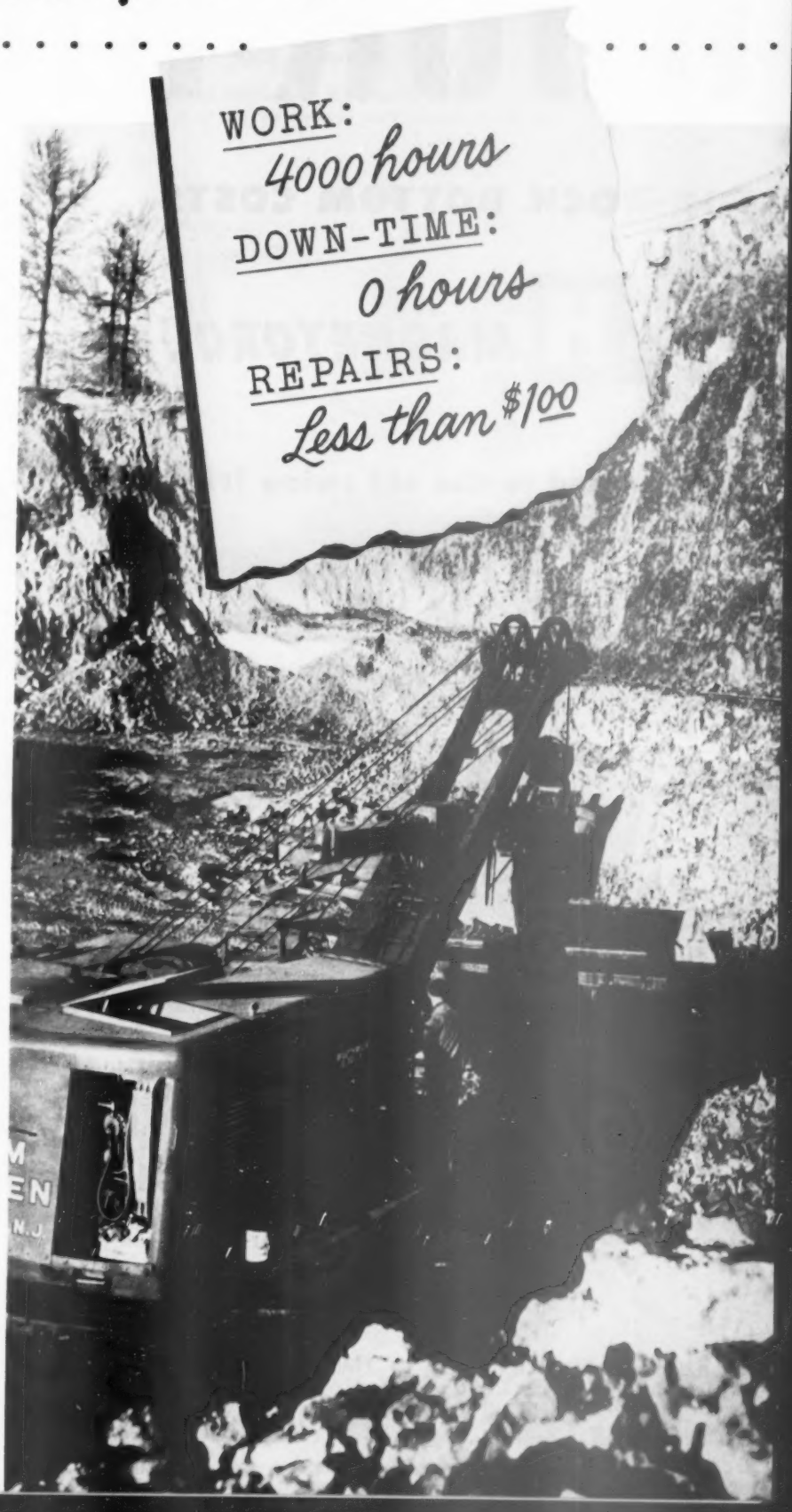
Specify "Cat" Diesels in the equipment you buy. Let your "Caterpillar" Dealer help you select the right size engine for repowering your present equipment.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT



ROCK RATED!

FOR ROCK BOTTOM COSTS

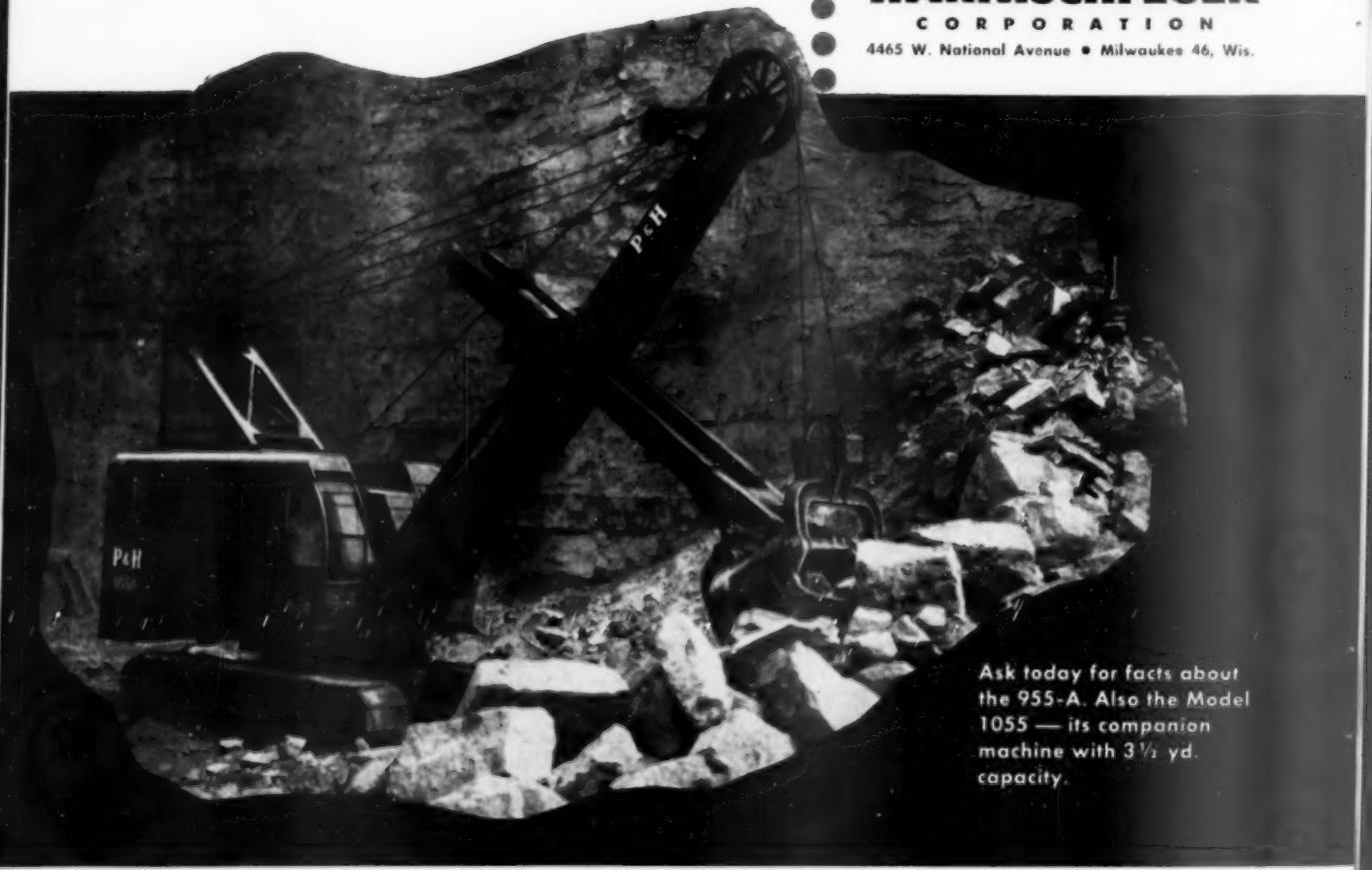
P&H MAGNETORQUE*

puts an end to the old swing frictions

We'll make this promise: You'll never have to "baby" this machine, even in the heaviest going! It's *built* for it — all-welded of alloy steels throughout, the toughest construction known. *It means steady digging.*
But the big pay-off in extra production comes with Magnetorque electric swing — enough faster to deliver 5 cycles to 4 on other machines in the 2½ yd. class. And the "time-outs" for adjustment and replacement of swing friction linings can now be salvaged for increased yardage. Magnetorque lasts the life of the machine.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

HARNISCHFEGER
CORPORATION
4465 W. National Avenue • Milwaukee 46, Wis.

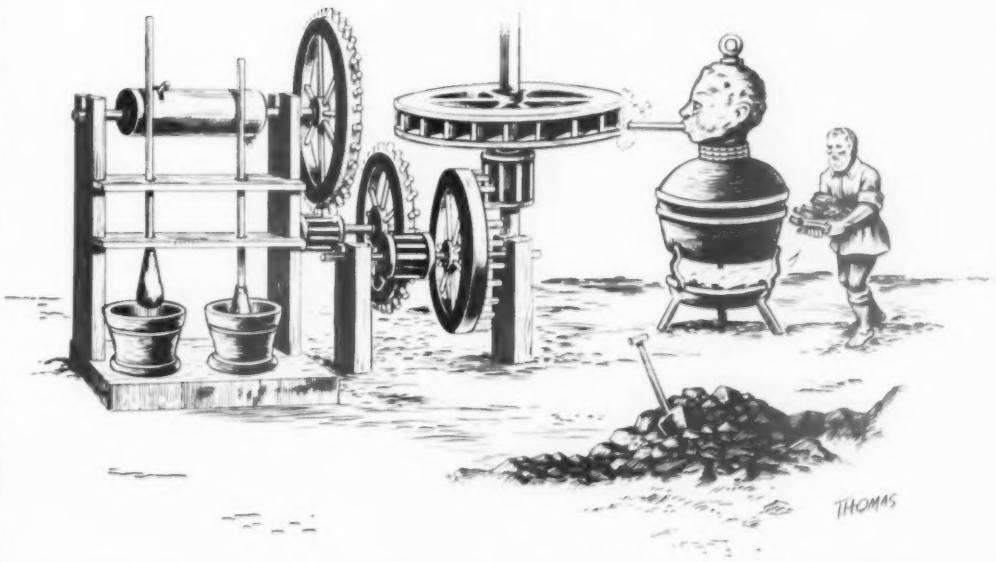


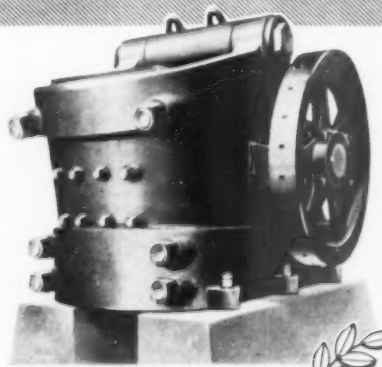
Ask today for facts about the 955-A. Also the Model 1055 — its companion machine with 3½ yd. capacity.

POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FABRICATED HOMES

This is the first steam turbine . . .

designed for crushing purposes by the engineer Branca in 1629. Crude as it was, it opened new doors to more efficient production.





The Traylor Type R Jaw Crusher, with its scientifically reinforced Meehanite frame and special features, contributes to plant efficiency and lowers the cost of production. Bulletin 1123 gives description.

History shows that by coupling inventiveness with hard work, man has constantly improved the tools he needs to do a better job. For 50 years, Traylor has carried on this tradition by developing new and better rock crushing equipment. In that time, Traylor machinery has gained a world wide reputation for efficiency and dependability on the job. It takes experience to meet the demands of progressive rock crushing methods today. Traylor has experience . . . half a century of it.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952

TRAYLOR ENGINEERING & MANUFACTURING CO.
1425 MILL ST., ALLENTOWN, PA.
Sales Offices: New York • Chicago • San Francisco

a **Traylor** *leads to greater profits*

"Bedeviled Copper" helps to build a battleship

● The hard, ductile, malleable metal known as NICKEL derives its name from "kupfer-nickel", meaning *bedeviled copper,* a name given it by superstitious medieval Saxon miners. These miners, in uncovering what appeared to be a fresh lode of silver ore, thought the devil of the earth, *"Old Nick",* had cast a spell over their ore since it could not be hammered into useful articles . . . *and it was several hundreds of years later that Cronstedt's discovery led to the actual recognition of nickel.*

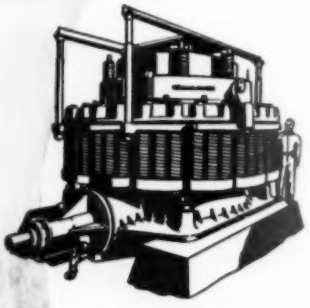
Among the thousands of ways in which nickel now serves man is in the construction of a modern battleship—where this versatile corrosion-resistant metal is used in armor plate, gun tubes, and scores of other ordnance, navigational and communications material.

From the opening of the first Sudbury mine in 1886, the history of nickel is largely that of *International Nickel Company,* who today produce fully 75% of the world's total nickel output. Playing an important role in International Nickel Company's production are twenty *"SYMONS"* Cone Crushers . . . which are recognized throughout the world for their ability to efficiently produce a great quantity of finely crushed product at low cost.

Thus, through the 20 "SYMONS" *Cone Crushers at "Inco" mines passes the majority of nickel used today . . . one more example of a job well done by* "SYMONS" *Cones.*

C652

NORDBERG MFG. CO., Milwaukee, Wisconsin



● **"SYMONS" Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter —in capacities from 6 to 900 tons per hour.**

"SYMONS" . . . A NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

"SYMONS" Primary Crushers

Grinding Mills

Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens

Diesel Engines

NORDBERG

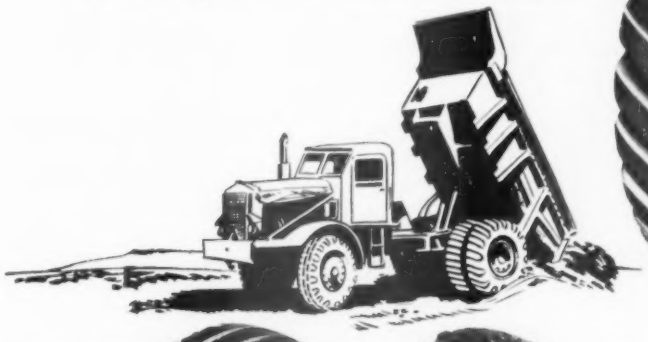
MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO

MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG

BRAWN for tire-bruising jobs

NAME the jobs where stone bruises, cuts and snags are damaging your tires — and you've named the jobs for this rugged giant. For this is the Hard Rock Lug — the super-tough Goodyear with sidewalls armored by massive lug bars, with an extra-thick undertread protecting its extra-thick body, with a self-cleaning tread that means better traction forward or reverse. No wonder the Hard Rock Lug is top favorite with cost-wise operators for mining and pit and quarry work, and for all the toughest, roughest, tire-killing hauls!



HARD ROCK LUG
Super-tough champ in all types of tire-killing work.

HARD ROCK RIB
Companion tire for front wheels in all tire-killing service. Easier steering, smooth rolling, same cord body, same shoulder and sidewall as the Hard Rock Lug.

ROAD LUG
The high-stamina, dual-purpose tire that's best for trucks operating both OFF and ON the road. Tough construction and special tread design provide super traction off the road—long, smooth mileage on the road.

THERE'S A COST-CUTTING GOODYEAR TIRE FOR EVERY JOB

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

AGAIN... KENNEDY PRESENTS AN INNOVATION IN CRUSHING EQUIPMENT!

NEW

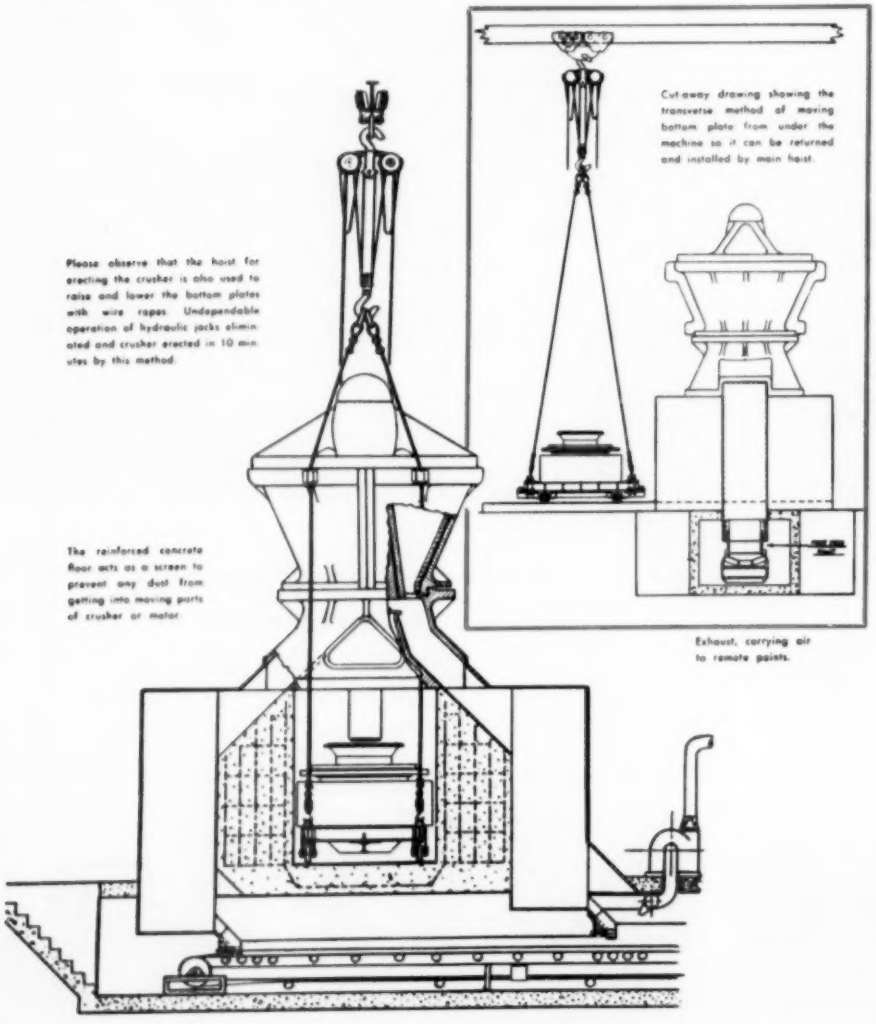
Gyratory Crusher with dual discharge outlets increases output and efficiency!

Only KENNEDY has the correct answer to the "Sticky Ore" problem! KENNEDY Gearless Gyratory Crushers are now built with TWO DISCHARGE OUTLETS plus an exclusive "No-Stick" feature that doubles efficiency and output. This distinct innovation in crusher design is another "FIRST" for the world-famous line of KENNEDY crushing equipment.

Hard-to-crush rock and ore such as limestone, trap rock, basalt, taconite, slag, etc., *containing as high as 50% clay*, can be handled without sticking or clogging by the exclusive KVS process.

No other crusher offers this advantage. Double discharge outlets, built at a discharge angle of 70°, assures uninterrupted delivery of material. Other crushers, with single 42° outlets, operate more slowly because the discharge outlet becomes clogged with sticky clay or taconite ore.

In the new KVS crushers, rock and ore pass through mantle and concaves at bottom. A vertical drop of 6 feet then quickly and surely disgorges sticky clay, etc.—greatly speeds production by eliminating clogging—saves countless man hours clearing stalled crushers.


Cut-away drawing showing the transverse method of moving bottom plate from under the machine so it can be returned and installed by main hoist.
Please observe that the hoist for erecting the crusher is also used to raise and lower the bottom plates with wire ropes. Undependable operation of hydraulic jacks eliminated and crusher erected in 10 minutes by this method.
The reinforced concrete floor acts as a screen to prevent any dust from getting into moving parts of crusher or motor.
Exhaust, carrying air to remote points.

CHECK THESE FEATURES!

Synchronous motor built into pulley assembly

Smooth frictionless operation because the crusher is gearless

Power used ONLY for crushing

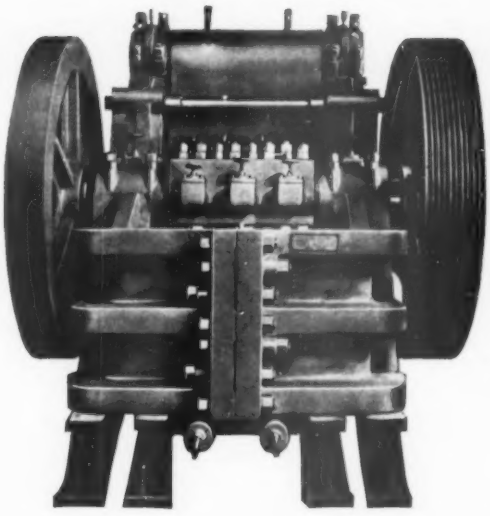
All moving parts carried on self-aligning roller bearings

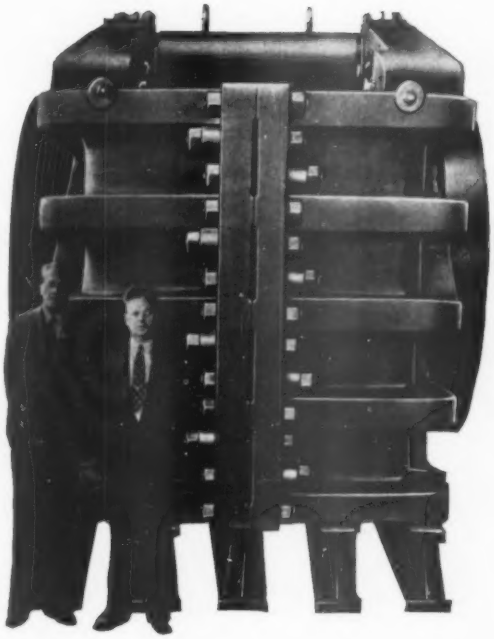
KVS forced-feed oiling system pumps four barrels of oil per hour through bearings without waste

Eccentric and ball are spray babbited. NONE has been rebabbited in over three years

Send for bulletins describing all types of KVS crushers. Let us prove that "It Costs Less To Own The Best".

KENNEDY Swing Jaw Crushers





2-Section split frames of Herculite steel built to "take it" as well as "give it"

The strongest heavy-duty crushers ever built! Designed by KV's engineers to handle maximum rock and ore loads . . . built to reduce those "Hard-to-Crush" raw materials with minimum effort and lowest power consumption.

Real gluttons for work . . . versatile, sturdy, ready and able to handle the toughest crushing assignment and ask for more! Dependable under all operating conditions . . . trouble-free . . . constructed to give years of service . . . able to "take it" as well as "give it".

Swing Jaws are reversible, end-to-end, side-to-side, to give *twice* the wear of ordinary types. Jaw plates made in one piece; swing jaw shafts cast integral with swing jaws . . . excessive wear eliminated.

All-in-all, the strongest jaw crusher built. Made in various sizes to meet your own specifications. Ask our engineering department to submit operating data, capacities, weights, etc.

Send for illustrated bulletin describing KV's swing jaw crusher.

EXCLUSIVE FEATURES OF THE KVS SWING JAW CRUSHERS....

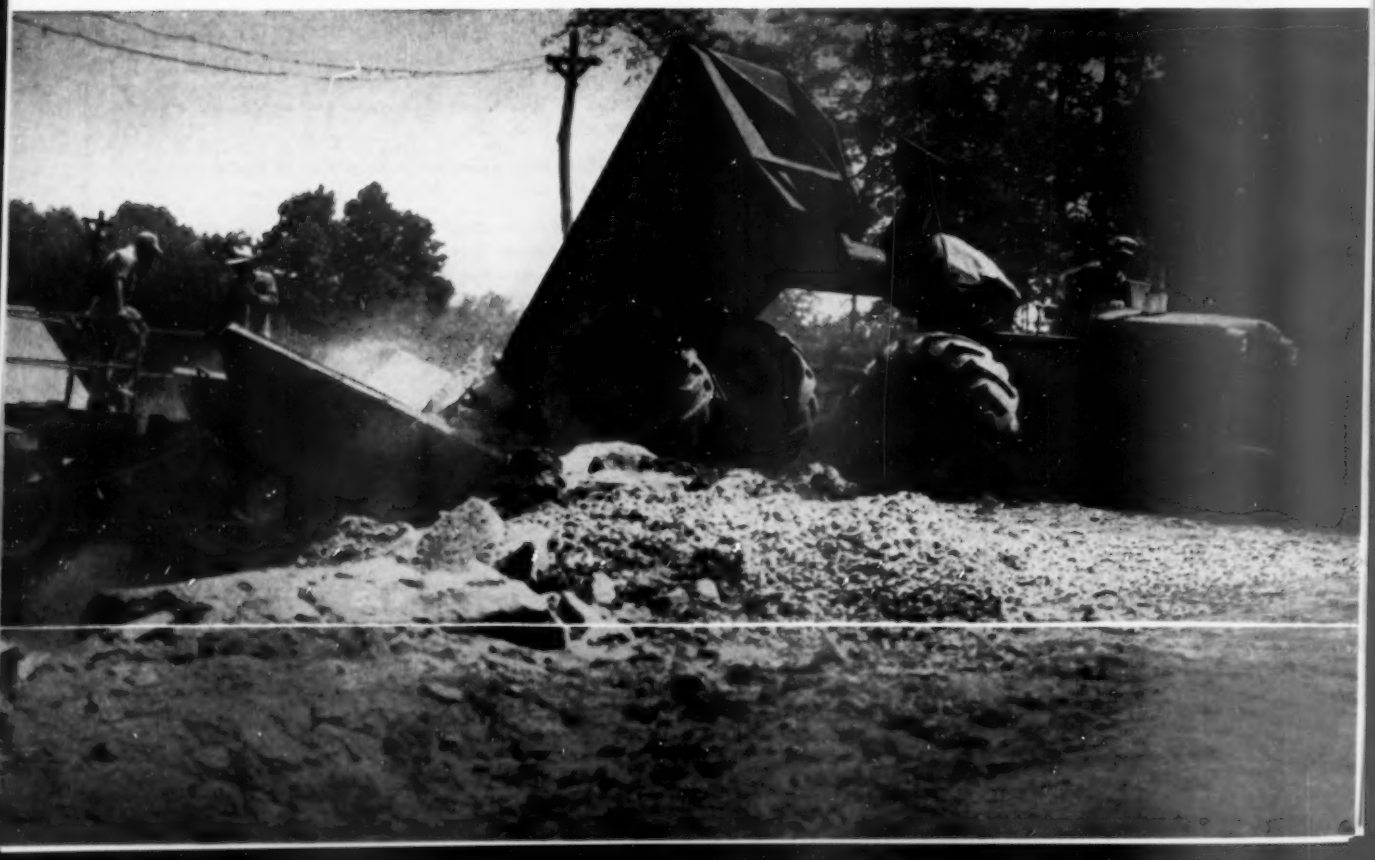
- Frames built of open hearth or Herculite steel with tensile strength of 60,000 lbs. per sq. inch.
- Counter-balanced fly wheel for lifting pitman at bottom of stroke. Hoisting engine or jacks not required to start machine.
- Frames made in two sections, bolted together at centers. Bolts thrown into tension whenever strain develops. This exclusive KV's feature is superior to construction methods where machines are joined at corners.
- Rigid strength of frames; toughness of jaw plates adds years of service to crusher; enables it to better withstand shock and stress of crushing tough rock and ore.

IT COSTS LESS.. TO OWN THE BEST!

KENNEDY-VAN SAUN
MANUFACTURING & ENGINEERING CORPORATION
TWO PARK AVENUE, NEW YORK
***FACTORY* DANVILLE, PA.**

Tournarocker turns 90° in 12'4" radius, spots fast despite restricted quarters on quarry ledge . . . with 5 to 6 passes from loader gets 7 heaped yds. in 2 to 3 min.

At hopper, Tournarocker dumps entire load in average of 15 seconds. Rig operates 10 hours per day, 6 days per week, supplies 100% of Olaton crusher requirements.



this application whips tight quarters of Kentucky quarry

Fort Hartford teams D Tournarocker with front-end loader

To speed limestone delivery from a new hillside quarry to their crusher at Olaton, Fort Hartford Stone Quarry of Hartford tried teaming a highly-maneuverable D Tournarocker with a 1¼-yd. front-end loader. This team worked so successfully in the cramped quarters of the quarry ledge, that the 9-ton "D" now supplies 100% of crusher requirements. Here's typical production:

52½ bank yds. hourly on 300′ haul

With 7′ loading height and low rear entry, Fort Hartford's Tournarocker is heaped with 7 yards of shot rock in 2 to 3 minutes. Short 300′ one-way haul to crusher takes only 20 seconds . . . dump, return, and spot, from 1 to 1½ minutes . . . complete 600′ cycle, 4 minutes. Output per 50-minute hour averages 12½ loads or 52½ bank yards (40% voids). To minimize spotting time in the highly restricted loading area, the mobile, electric-control Rear-Dump unit turns 90° within a radius of 12′4″.

"Thoroughly sold," says President

"We're thoroughly sold on the Tournarocker," says A. C. Hall, President of Fort Hartford. "It maneuvers well on our works where tight quarters are the general rule. We like it very much." The Company, a subsidiary of Fort Hartford Coal Company, also uses their "D" to haul overburden. Their year-around operation clearly demonstrates that the 9-ton D Tournarocker can be profitably loaded with small front-end loaders.

To find out how versatile rear-dump Tournarockers can add to *your* profits, have your LeTourneau Distributor show you owner-verified reports on work similar to your own. Ask him how Tournarocker's many revolutionary features can help increase your production . . . provide greater operating safety . . . and lower maintenance costs. There's a size to fit your needs . . . 9, 18, 35, or 50 tons.

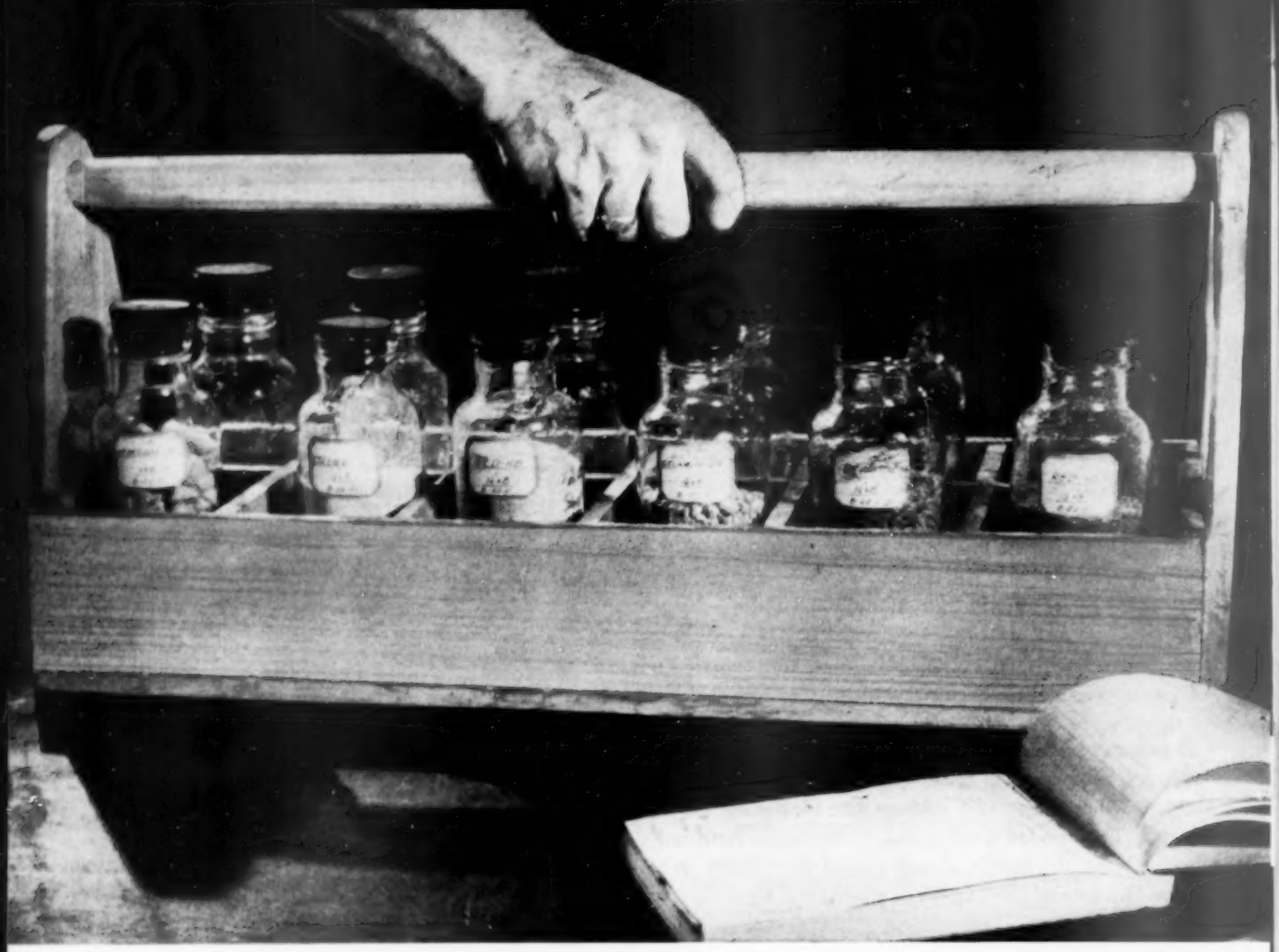
High-speed, rubber-tired excavating hauling • lifting equipment

R. G. LeTOURNEAU, INC., Peoria, Illinois

7′ loading height and low rear entry speed loading . . . 3-ply steel-grid bowl takes shocks of loading big-chunk limestone, requires minimum patching and welding.

Hauling from pit to crusher, Tournarocker's 4-wheel Multi-disc air brakes provided sure control at all times. Unit safely worked over 16% grades while stripping overburden.

PROGRESS IN EXPLOSIVES . . .



EVERY LOT TESTED

Here are some of the samples of explosives taken daily at one Hercules plant. Every day, at every plant, samples of each lot are analyzed and tested for conformity with Hercules' strict chemical and physical standards.

Sensitivity, consistency, water resistance, moisture content, density, percentages of various ingredients . . . these are some of the exacting laboratory inspection standards that must be met.

From raw materials to packaged products, Hercules' progress in explosives assures better blasting performance and helps to lower blasting costs.

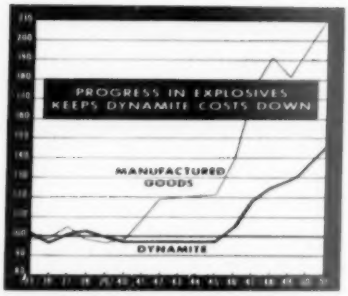
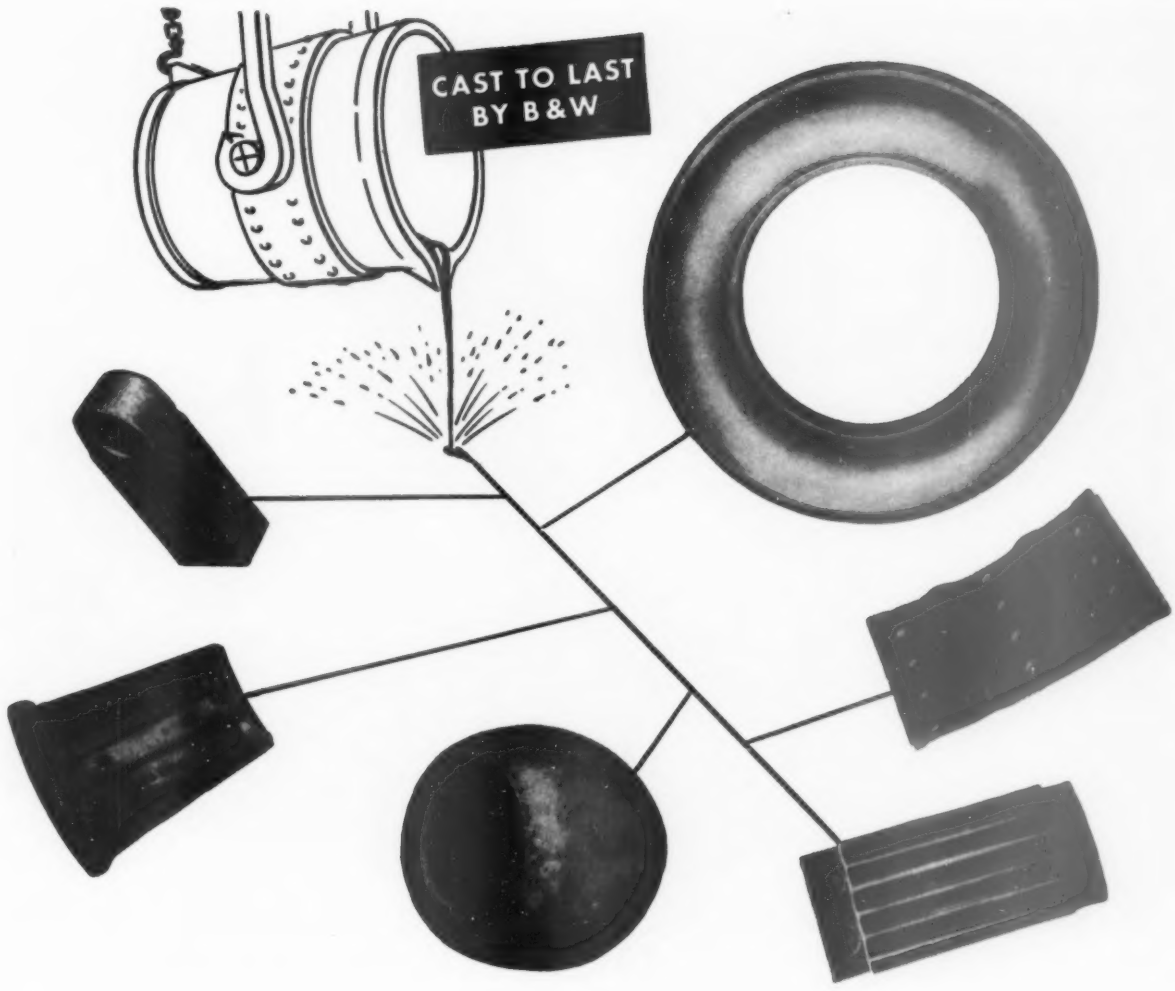


Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values = 100.

HERCULES POWDER COMPANY

INCORPORATED

Explosives Department, 946 King St., Wilmington 99, Del.



Outstanding for Cost-Saving Service Life

B&W WEAR-RESISTANT CASTINGS have a long record for giving superlative service life in a wide variety of applications in cement mills and other rock products plants. Their high strength and superior resistance to all abrasive conditions encountered in these gruelling operations account for their outstanding performance. Operating in crushers and grinders, ball and tube mills, hammer mills, clinker chutes and coolers, kilns, stamp mills, and elevators, parts made from B&W wear-metal are keeping equipment on the job—reducing costly shutdowns for repairs and replacements. The Babcock & Wilcox Company, Process Equipment Department, Barberton, Ohio.

BABCOCK & WILCOX

5-419

QUARTER-MILE ROADBED...sun-baked, ice-swept... YET STILL ON THE MOVE AFTER 14 YEARS OF COAL HAULING SERVICE!!!

Photographs may not lie; but, here's one that falls far short of telling the whole truth about the remarkable performance records chalked up by this Republic Rubber's Coal Handling Conveyor Belt.

But, then it's quite a story! You can see for yourself there's lots of sky overhead and that means sun . . . constant, unrelenting sun beating down on the conveyor belt surfaces, until seasonal changes bring about onslaughts of rain, snow and sleet.

The load, of course, is coal . . . an abrasive, mine run coal that's dropped through chutes and carried by the belt to stockpiles located throughout the dock area.

With these facts in mind and knowing that when the ship moves out, there's nothing to protect the belt against spraying lake water, consider this:

The belt is now fourteen years old and still going strong!!!

Purposefully, we've left the photo unretouched to show you just what a 14-year old Republic Rubber Conveyor Belt really looks like . . . to show you just how well a Republic Conveyor Belt stands against the ravages of time, hard labor and all the elements can throw at it. Incidentally, the dark spots you see on the belt's surface aren't worn places at all. That's water . . . water that makes ordinary conveyor belts mildew and prematurely fail, but holds few terrors for Republic Conveyor Belting because they're "mildew-proofed"!

It's to your advantage to learn why Republic Conveyor Belts like this can year in, year out, many times outperform and outlast other brands of belting.

Despite abrasion, impact, flexing, weathering or contact with heat, oil and chemicals, Republic Conveyor Belts continue to be your best insurance against breakdowns, short life and high handling costs.

Write us today for the name of your local Republic Rubber Distributor who can offer expert advice and fast service on all industrial Rubber Products.

Remember, whether it's hose, belting, packing or any one of hundreds of different molded and extruded specialties . . . **if it's built of rubber, Republic builds it better!**

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS

WIRE ROPE

This is the most economical rope we've ever made for quarries

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the quarryman's best choice for efficiency and long life. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 701 ST. CLAIR AVE., N. E. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

Advance-Design

CHEVROLET TRUCKS

These PLAIN HARD FACTS are important to economy-minded truck buyers

first in demand in value in sales

CHEVROLET

Fact No. 1

CHEVROLETS LIST FOR LESS

First cost—the list price—is less for a Chevrolet than for any comparable truck capable of handling the same payload. Chevrolet's position as the world's largest manufacturer of trucks makes possible production savings that are passed on to you.

Fact No. 2

COST LESS ON THE JOB

Proved Chevrolet truck features save money over thousands of miles. Time-tested Valve-in-Head engines, rugged hypoid rear axles, extra-sturdy channel-type frames, Flexi-Mounted cabs, Ball-Gear steering, Synchro-Mesh transmissions, all contribute to low operating costs with high dependability.

Fact No. 3

EACH TRUCK TAILORED TO ITS JOB

Every Chevrolet truck is *factory-matched* to the job it's going to do. Tires, axles, frame, springs, engine, transmission, and brakes are right for the operating conditions and load. Whatever your job is, there's a Chevrolet truck to fit it.

Fact No. 4

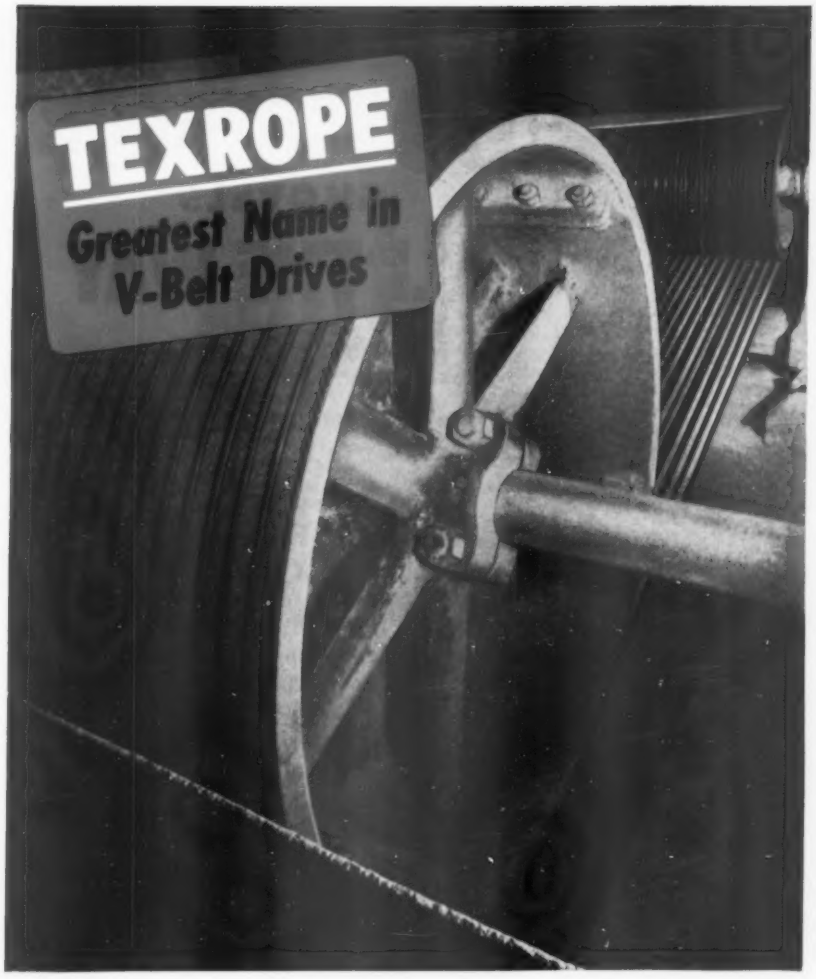
WORTH MORE AT TRADE-IN TIME

Chevrolet trucks traditionally bring more at resale than other makes costing about the same when new. Chevrolet trucks keep their value longer and give you real, substantial savings right up to the day you sell them. See your Chevrolet dealer soon.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

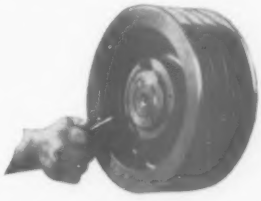
TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN



TEXROPE **Grommet V-Belts**—20 to 50% longer life than ordinary belts. Size for size, grommet belts give 1/3 more gripping power, pull heavier loads with higher safety factor.

STANDARD CAST IRON SHEAVES — Made to order from stock patterns. One to 14 grooves for A, B, C, D or E belts. One to 1000 horsepower. Split sheave or split hub.



MAGIC-GRIP **SHEAVES** — Semi-steel casting with interchangeable, patented taper bushings. On and off in a jiffy. Cannot shake loose. Two to 12 grooves for B, C and D belts; 2 to 250 hp.

Everything in V-Belt Drives

from one reliable source!

GRIT, VIBRATION AND SHOCK LOADS make quarry operations tough on drives. Allis-Chalmers has both the engineering experience and the drive equipment to lick both the usual and unusual problems. Call your nearby Allis-Chalmers distributor or district office for help on your drive problems, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3849

Texrope and Magic-Grip are Allis-Chalmers trademarks.

Sold . . .

Applied . . .

Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

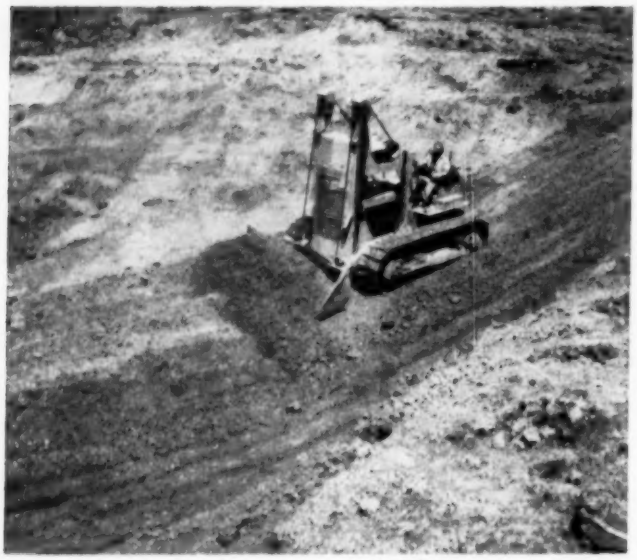
PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

IT'S TRAXCAVATOR® SHOVELS ALL THE WAY

For Samuel D. Kraus Co.
General Contractors, St. Louis, Missouri

...IN PRODUCING PIT MATERIAL FOR ELECTRIC POWER PLANT CONSTRUCTION!



STRIPPING...
Removing 6 feet of damp, red-clay overburden, called for big, sure-footed power—the T7 TRAXCAVATOR Shovel had it. With over 21,000 pounds of push, the T7 heaps its 2½ cu. yd. bucket in 20 seconds ... pushes the load 300 feet in 70 seconds ... dumps and is back for another in 40 seconds—to move over 75 yards an hour!

STOCKPILING...
The uncovered gravel—1" rock with clay binder—is 'dozed 200 feet down a 5% grade by a T6 TRAXCAVATOR Shovel. 2½ to 4 cu. yds. pile up before the bucket. At the base of the slope the T6 puts the material into 8-foot stock-piles. Cycle time: 110 seconds!

LOADING...
An HT4 TRAXCAVATOR Shovel takes over—loads sixteen 5 and 7 cu. yd. trucks each hour. High-lifting bucket easily clears big dump bodies. Material is being used in the construction of a huge electrical generating plant in Southern Illinois.

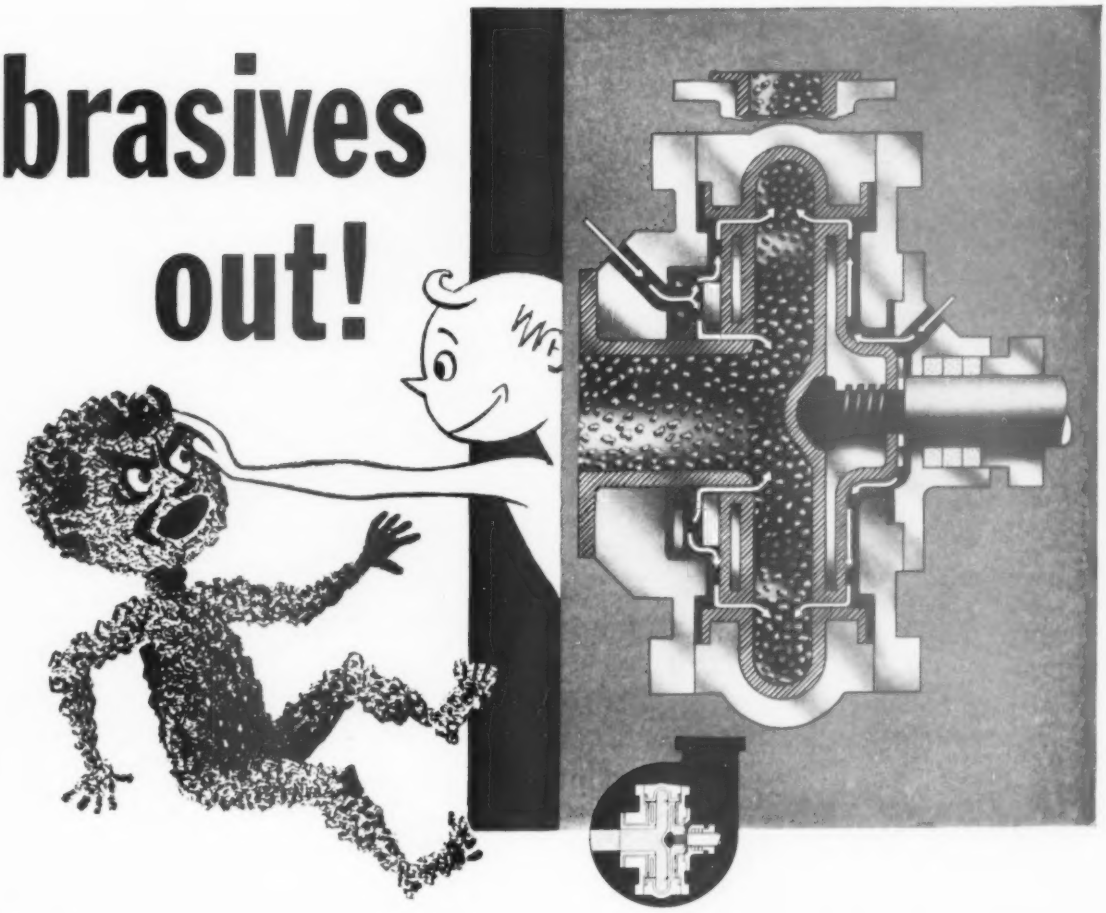
There's a TRAXCAVATOR Shovel to do your jobs, too—and do them at a cost so low that profits are insured! See your "Caterpillar" Dealer for full details or write direct.

CATERPILLAR TRACTOR CO., Peoria, Illinois

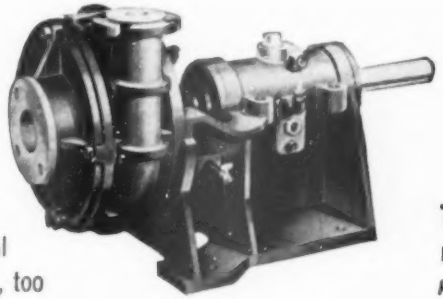
TRACKSON
REG. U. S. PAT. OFF.
A SUBSIDIARY OF CATERPILLAR

TRAXCAVATOR SHOVELS
TRACLOADERS
PIPE LAYERS
ANGLEFILLERS

Abrasives out!



Abrasives are kept from making trouble in Hydroseal Pumps by a small amount of clear water that flows in the direction shown by the arrows. At a pressure slightly above pump discharge, this sealing water prevents abrasives from entering the clearances between the impeller and side plates. "Double pumping" is thus eliminated, giving high initial efficiency. More important, since this hydrosealing protects close clearances from wear, these pumps maintain their high efficiency for life. As a result, power savings alone generally pay for Hydroseals in a short period of time.



Vertical pumps, too

If you have a decision to make on sand, slurry, or dredge pumps, get the Hydroseal facts before you make up your mind. Write for Catalog No. 552.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. E—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL **SAND, SLURRY & DREDGE PUMPS**
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

"Dodge makes hauls some other trucks can't handle!"

says **John S. Scofield,**
Scofield & Co.,
Freeport, Illinois

"We haul sand and gravel, and do general contract hauling throughout the Freeport area," says Mr. Scofield. "The highways are hilly, and 30% of our work is off the roads. It takes a rugged truck to stand up in this area. As far as we're concerned, Dodge tops the list!

"We keep complete individual records on each of our trucks and have found that Dodge is by far the lowest cost to operate. In fact, our Dodge costs us .6 of a cent less per ton-mile than our next closest truck!

"What's more, Dodge makes hauls some other trucks can't handle . . . *with a full load and a lot of uphill climbing!* Our next truck will be a Dodge."

Mr. Scofield's enthusiastic praise is typical of hauling men everywhere when it comes to Dodge "*Job-Rated*" trucks. Through experience, they've found that a Dodge hauls heaviest loads with cost-cutting economy . . . because it's "*Job-Rated*" to fit the job and to give longer truck life.

Further, they have found, for example, that Dodge provides a high-powered, high-compression engine that takes their toughest jobs in stride. They've discovered, too, that a Dodge carries bigger payloads without overloading, thanks to better weight distribution. And add to this such Dodge economy advantages as four-ring pistons with chrome-plated top rings, exhaust valve seat inserts and, on high-tonnage models, optional twin carburetion and exhaust system!

Certainly you, too, will want to profit from all the extra value you get with extra-powerful Dodge "*Job-Rated*" trucks. And the man to see for the full lowdown is a neighbor of yours—your friendly Dodge dealer. He's a mighty nice guy to do business with any time.

DODGE "Job-Rated" TRUCKS

TELSMITH ENGINEERED

NEW Tyrone Rock Products Co. plant PRODUCES 3000 TONS A DAY at low cost...with TELSMITH Conveying and Screening Equipment

• To serve the rapidly growing Atlanta market, this modern plant at Tyrone, Ga., is a remarkably efficient, low-cost operation. Designed and engineered by Telsmith, its average capacity is about 300 tons per hour with peaks of 450 tons. Highly efficient screening is supplied by 13 Telsmith vibrating screens making 8 sizes of crushed granite (−2″ to −8 mesh) for railroad ballast, and concrete and asphalt construction.

Finished sizes are stockpiled over a reclaiming tunnel, then rinsed and delivered to bins for loading cars and trucks. Telsmith did all engineering, including detailed drawings, furnished all screens and conveyors and carefully co-ordinated all equipment for smooth, efficient operation. To relieve yourself of technical details and to be sure of satisfactory results, consult Telsmith without obligation. Send for Bulletin 266.

TELSMITH Equipment in this Plant

- One (1) 5′ x 12′ Pulsator Single Deck Scalping Screen
- One (1) 5′ x 12′ Pulsator Double Deck Scalping Screen
- One (1) 4′ x 10′ Pulsator Double Deck Rinsing Screen
- Eight (8) 5′ x 12′ Vibro-King Single Deck Finishing Screens
- Two (2) 4′ x 10′ Vibro-King Single Deck Finishing Screens
- Twelve (12) Telsmith-BG Conveyors 18″ to 42″ wide, 42′ to 200′ long
- Fifteen (15) 16″ x 18″ Bin Gates Boquad Tunnel Type

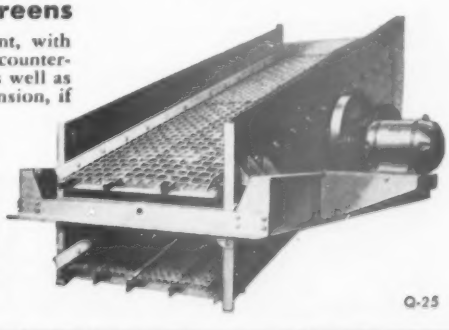
TYRONE USES Thirteen (13) TELSMITH SCREENS

Ten (10) VIBRO-KING 2-Bearing Screens

For Finished Screening. Simpler, more efficient, with lower upkeep. Telsmith-patented automatic counter-weights assure smooth starting and stopping as well as exceptionally smooth operation. Cable suspension, if desired. Five sizes: 1, 2, or 3 decks.

Three (3) PULSATOR 4-Bearing Screens

Recommended for heavy-duty scalping or screening large sized aggregates; uniform and efficient on all decks, under heaviest loads. Eleven sizes: 1, 2, or 3 decks.



Q-25

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

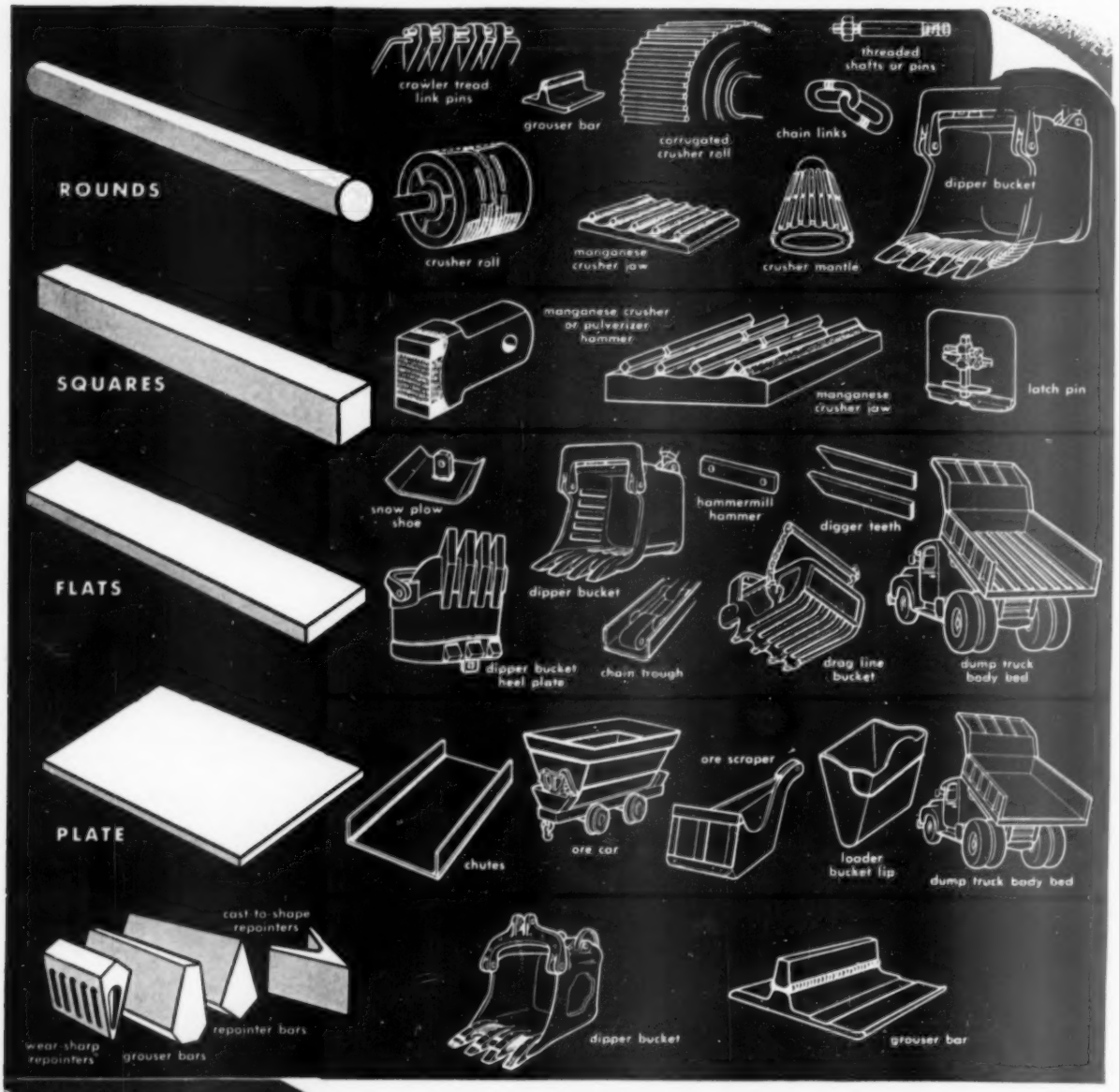
Cable Address: Sengworks, Milwaukee

51 East 42nd St. New York 17, N. Y. • 211 W. Wacker Drive Chicago 6, Ill. • 713 Commercial Trust Bldg. Philadelphia 2, Pa. • 238 Main Street Cambridge 42, Mass. • Boeheck Eqpt. Co. Milwaukee 3, Wis. • A. N. Wigle, 294-6 N. Roosevelt Ct. Columbus 9, Ohio

Clyde Eqpt. Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Eng. & Eqpt. Co., San Francisco 4, Calif. • Interstate Equipment Co., Statesville, N. C.

Rish Eqpt. Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Wessner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.

AMSCO MANGANESE STEEL WELDMENTS
ADD NEW LIFE TO WORN EQUIPMENT



Amsco Welding Rods and Electrodes For repair welding of manganese steel shapes to worn equipment, American Manganese Steel Electrodes retain their toughness and give real operating savings.

Amscoating with Amsco Hardfacing Rods increases service life . . . reduces shutdowns.

Contact your Amsco Distributor or write for illustrated catalog WA-77 on Amsco Manganese Steel Weldments and Hardfacing Selector Guide.

Brake Shoe | **AMERICAN MANGANESE STEEL DIVISION**
377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

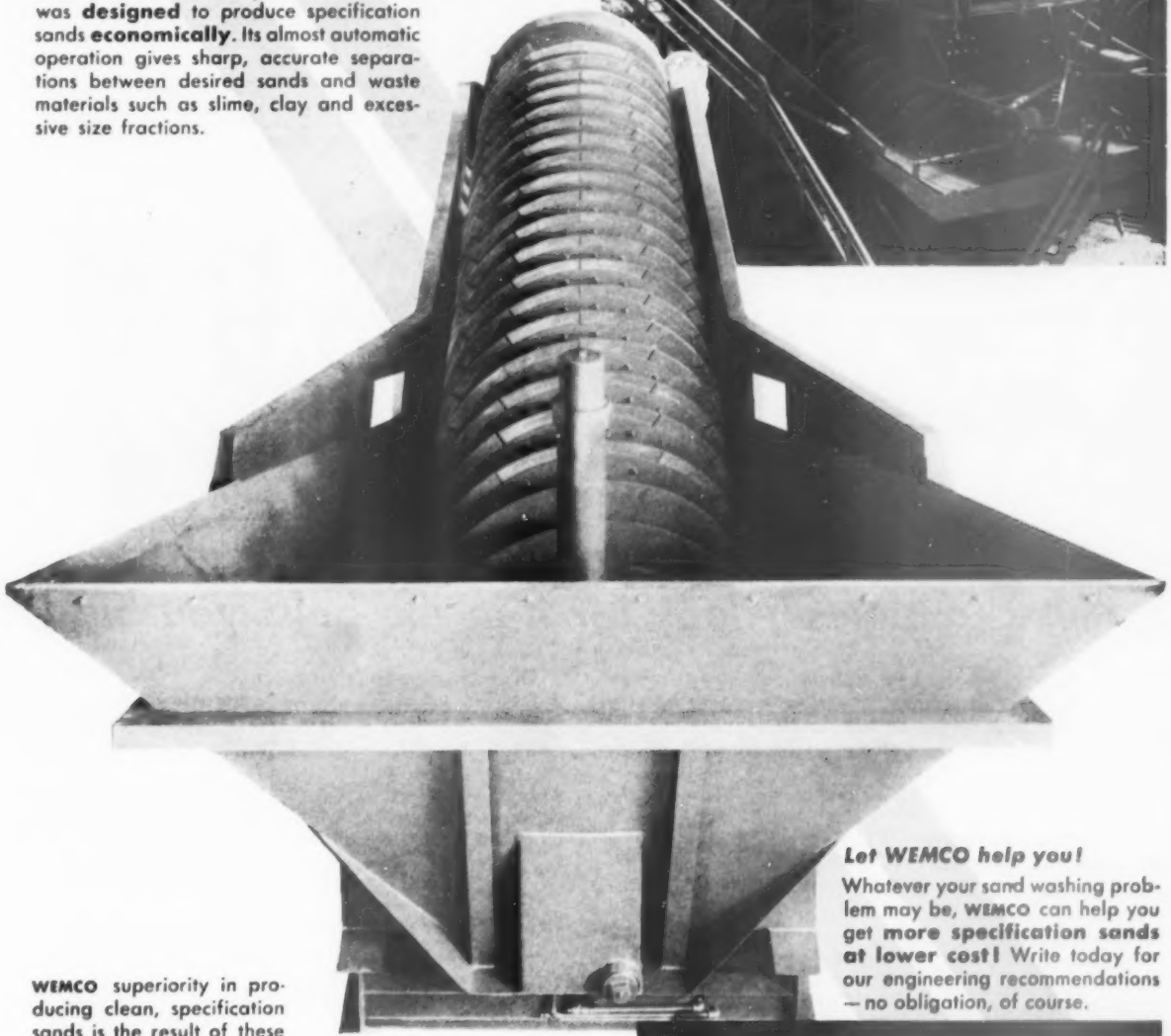
Other plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

MORE SPECIFICATION SANDS AT **LESS** COST with **WEMCO** SAND PREPARATION MACHINES

More and more operators are proving this outstanding fact about WEMCO machines:

- *you actually get a greater production of clean, specification sands at substantially lower costs per ton than is possible with any other type of equipment.*

The **WEMCO** Sand Preparation Machine was **designed** to produce specification sands **economically.** Its almost automatic operation gives sharp, accurate separations between desired sands and waste materials such as slime, clay and excessive size fractions.



Let WEMCO help you!

Whatever your sand washing problem may be, **WEMCO** can help you get **more specification sands at lower cost!** Write today for our engineering recommendations — no obligation, of course.

WEMCO superiority in producing clean, specification sands is the result of these important features:

- *large settling area*
- *wide overflow weir capacity*
- *high raking capacity*
- *sharp size separations*
- *low maintenance costs*
- *low horsepower*
- *minimum attendance requirements*

WEMCO

WESTERN MACHINERY COMPANY

760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

OTHER **WEMCO** PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps Cone Separators • Drum Separators • Fagergren Laboratory Units • Agitators Fagergren & Steffensen Flotation Machines • Hydroseparators • S-H Classifiers HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

*Overcured Sections — present every 30′ to 40′ in all belts made by the flat press method. Only Rotocuring (continuous, non-stop curing) eliminates this major cause of belt failures.

Here Lies a Good Conveyor Belt ...killed by OCS*

—BWH ROTOCURE prevents these fatalities — look for it in the belts you buy

Press overlaps, inherent in belts cured by flat press methods, are a primary cause of early belt failure. The overlaps result in overcured segments 2″ to 4″ wide across the entire belt because vulcanization is *not* continuous. These 2″ to 4″ segments are *double cured* — and *double curing weakens the structure!*

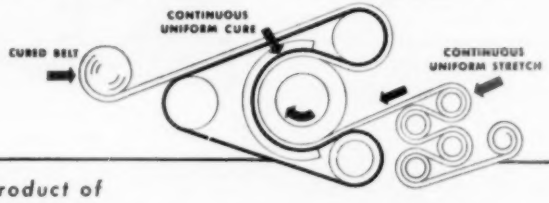
When you buy a BWH conveyor belt made by the *continuous* ROTOCURE process of vulcanization you obtain a *uniformly strong* belt *overall.* The weakened segments due to overlapping that sabotage operations and inflate belting costs are completely eliminated. With continuous, endless vulcanization you'll be ahead four ways:

1. In increased belt flex life — as much as 40%
2. In elimination of mechanical distortion at the press ends
3. In constant, uniform stretch
4. In uniform, abrasion-resistant covers

These characteristics of BWH Conveyor Belts mean minimum belt maintenance costs, longer belt life and appreciable per ton savings in the cost of what you convey! Ask your BWH distributor to show you how these highly serviceable belts can help you. Or write us direct.**

**Ask him also about BWH Rotocured Transmission Belts. Because they permit operation at lower tensions, you are assured of longest possible belt life.

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



BWH DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P.O. BOX 1071, BOSTON 3, MASS., U. S. A.
WAREHOUSE STOCK, 111 NORTH CANAL ST., CHICAGO, ILLINOIS

MORE STANDARD SIZES TO CHOOSE FROM

In the range from 1 to 400 horsepower JONES offers the most complete line of Herringbone Gear Speed Reducers available *ANYWHERE*.

Jones

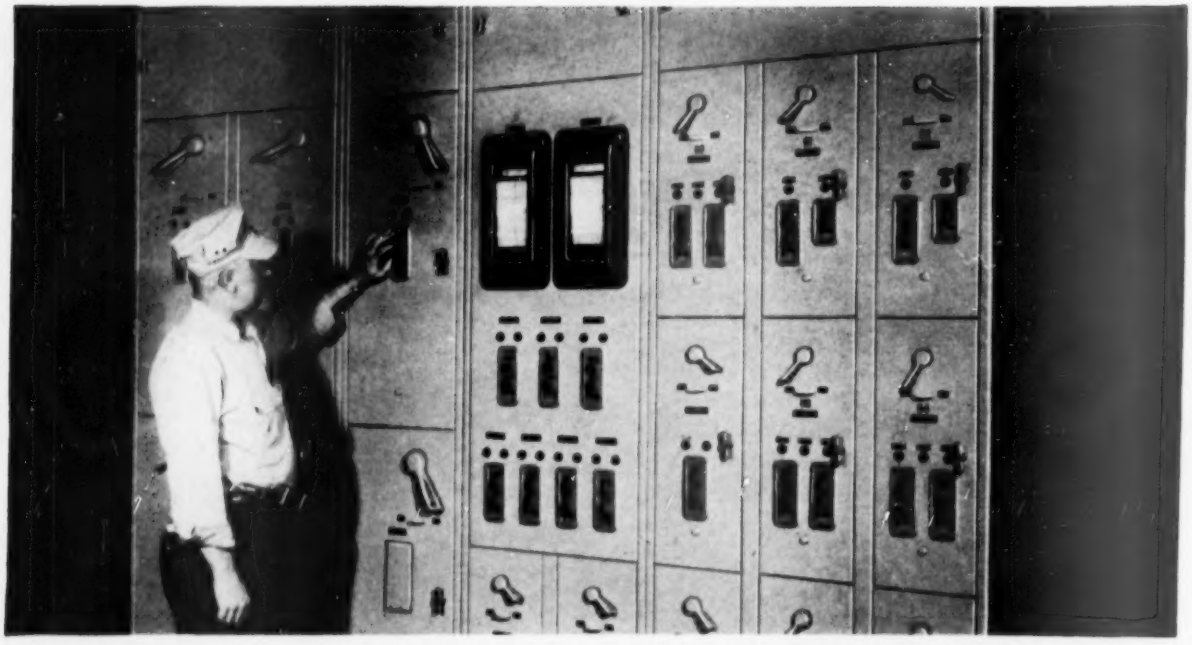
Manufacturers of a comprehensive line of quality Herringbone Gear Speed Reducers, Worm Helical Gear Speed Reducers and Worm Gear Speed Reducers

Since 1890 . . . In the Service of Industry

W. A. JONES FOUNDRY & MACHINE COMPANY, 4447 Roosevelt Road, Chicago 24, Illinois

ONE MAN REGULATES all kiln-department functions at a control board in this large western cement plant. Built-in instruments indicate and record necessary data on all department drives, kiln temperatures, gas pressure, etc. The multiple-control panel has interlocked circuits so that kiln operations will be performed with greater efficiency and safety.

Centralized control increases



CENTRALIZED CONTROL for a number of 440-volt motors can be provided by a compact assembly of low-voltage G-E Cabinetrol*. Factory wired, it's easily planned, installed and serviced. Rigid steel enclosure gives workers maximum protection, resists entrance of cement dust.

*Registered trade-mark of General Electric Co.

MANPOWER-SAVING, this G-E control station in a Colorado cement mill brings all related processes in a department under control of one man, provides faster, more uniform production.

SPACE-SAVING, this G-E Limitamp high-voltage motor control combines starters and short-circuit protection in one unit. This lineup controls four 4160-volt synchronous motors.

cement output, saves manpower

Modernizing electrically with centralized control lets you co-ordinate plant operations more closely

Centralized control—as part of a comprehensive program of electrical modernization—can help you make most efficient use of your available manpower. It takes fewer steps by fewer men, for example, to co-ordinate related operations in a cement plant from General Electric control stations. And with interlocked G-E multiple control panels, you can help prevent production tie-ups, keep plant processes flowing evenly.

SYSTEM-ENGINEERED TO YOUR NEEDS

Engineered by skilled G-E industry specialists into a complete system to meet your individual needs, these centralized controls play a big part in moving uniform-quality cements through your plant—continuously, at a maximum rate, with minimum man-hours. Whatever department you plan to modernize—crushing, grinding, kiln, finish, or packhouse—let a G-E cement-industry specialist work with you from the start in planning an electric system that is reliable, safer, amply suited to your requirements.

MODERNIZE STEP BY STEP

Meanwhile, for mill-tested ideas you can use to increase your plant's capacity, send for a new G-E booklet just released. It shows how to modernize electrically to increase tomorrow's production, how to do it step by step to keep today's production going. For your copy, contact your nearest G-E Apparatus Sales Office and ask for Bulletin GEA-5469, or write to General Electric Company, Section 658-9, Schenectady 5, N. Y.

Engineered Electrical Systems for Rock Products Industry

GENERAL ELECTRIC

NEW Cedarapids Built by IOWA Schrock Motorized HEAD PULLEYS

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

ELIMINATES ALL MAINTENANCE ON SPROCKETS, CHAINS, JACK-SHAFTS, V-BELTS, ETC.

U.S. Pat. No. 3548399 Others Pending

WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact... requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.

Western Sales:
YUBA MANUFACTURING CO.
351 California St., San Francisco 4, Calif.

Test Pilot

"Just try those springs," the salesman says and his customer, canny as well as pretty, takes him at his word. She wants to be sure what she's getting.

Testing is a good way to double-check Multiwall bags too. Subject them to the toughest going you can. Make sure your manufacturer checks them also—continuously and against rigid performance standards.

In Union's testing laboratories, Multiwalls have to prove themselves constantly—for strength, durability, moisture resistance, sift-proofness, every characteristic you expect of a good package.

Union Multiwalls are *uniformly* high standard. They are manufactured in the world's largest integrated pulp-to-container plant. Only in an integrated plant can first-hand control be maintained over *every step* of the process by which your package is made.

Best proof of the value of this extra protection is in the buying habits of America's largest Multiwall users. Men who purchase more than 85 per cent of the total production of Multiwalls list* dependable quality as one of their most important considerations in choosing a Multiwall supplier.

Insistence on uniformly high manufacturing standards is one of the many good reasons why, to a greater extent each year, these major buyers turn to Union for a substantial share of their increased Multiwall requirements.

More so every day . . .

IT'S UNION FOR MULTIWALLS

TRADE MARK UNION

*August, 1951 research study.

UNION BAG & PAPER CORPORATION • NEW YORK: WOOLWORTH BUILDING • CHICAGO: DAILY NEWS BUILDING

SMIDTH

MACHINERY

FOR

CEMENT · LIME · ORE

Smidth Machinery has been supplied to over

70 COUNTRIES OF THE WORLD

INCLUDING

1000
Rotary Kilns

5000
Grinding Mills

In addition to rotary kilns and grinding mills, Smidth equipment includes a complete line of machinery such as coolers, agitators, washmills, pumps, conveyors, packers, separators, etc., with accessories, for use in Cement, Lime and Ore plants.

For Smidth Machinery apply to:

F. L. Smidth & Co., A/S
Vestergade 33,
Copenhagen K, Denmark

F. L. Smidth & Co.
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co., Ltd.,
105, Piccadilly,
London, W. 1, England

F. L. Smidth & Cie France
80 Rue Taitbout
Paris (9e) France

F. L. Smidth & Co. of Canada, Ltd.
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co. (Bombay) Ltd.
42 Queen's Road
Bombay, India

"WE HEAR..."

September, 1952

Construction has been started on the Nimbus dam and power plant on the American river, 14 miles east of Sacramento, Calif., as recently announced by the Bureau of Reclamation. The new dam and power plant comprise another unit of the Central Valley project. Specifications call for a concrete spillway section 22 ft. above the present river bed, topped by 18 radial gates, each 24 x 40 ft. An earth and rock dike 300 ft. long will extend south from the left abutment of the concrete section.

* * * * * * * * * *

Foreign manufacturers are cutting heavily into American export markets in South America, Europe and Africa, as recently reported by Engineering and Mining Journal. The reasons given were: (1) Europe's output, chiefly German, is expanding fast; (2) Europe is aggressively recapturing markets lost to the U.S. during the war; (3) foreign exporters go out of their way to master local languages and comply to the letter with important regulations; and (4) Americans generally don't.

* * * * * * * * * *

The development of a new glass fiber that can be used as an insulating material was recently announced by the National Production Authority. The new material substitutes staple glass fiber for a certain percentage of crude asbestos fiber, but differs from the combination cloth developed in World War II which consisted of alternate strands of asbestos yarn and glass yarn. In the new product, each strand of yarn is composed of the glass fiber mixed with asbestos fiber in the carding process, and is then spun, twisted and woven into several types of cloth.

* * * * * * * * * *

Twenty-six apartments in Henderson, Ky., reserved by the local housing commission for families with incomes below $1000 and renting for $15 to $20 per month, are remaining vacant. As stated by an executive director, "We can't find anyone making that little money."

* * * * * * * * * *

A western state department of employment security recently filed a lien claim for $1602 against a rock wool producer for non-payment of quarterly contributions to the state unemployment compensation fund during 1951.

* * * * * * * * * *

Construction contract awards in the 37 states east of the Rockies for the first six months of the year totaled $7,758,578,000, a decrease of 12 percent from the corresponding period of 1951, according to an F. W. Dodge Corp. report. Nonresidential awards of $2,698,975,000 were down 34 percent; residential awards of $3,344,037,000 were up 1 percent; public and private works and utilities, totaling $1,715,566,000, were up 21 percent. Total construction awards for the month of June totaled $1,488,850,000, which showed a 5 percent decrease from May, but a 6 percent increase over June, 1951.

* * * * * * * * * *

The development of a new synthetic rubber which is claimed to be greatly superior to that produced by the conventional "hot" rubber process and which eliminates the need of costly refrigeration equipment now used to produce "cold" rubber, has been announced by Firestone Tire & Rubber Co. It was stated that the new synthetic rubber possesses all the long-wearing attributes of cold rubber and can be produced with the same equipment as found in all synthetic rubber plants during World War II for output of GR-S rubber.

WE HEAR

A new Yugoslav magnesite deposit said to be sufficient to fill all the country's domestic requirements, with a considerable portion left over for export, is reported to have been discovered in Serbia.

* * * * * * * * *

A Bloomington, Ind., contractor and two bonding houses are suing the U.S. government for $520,261 for damages claimed because of erroneous specifications for a municipal airport at Zanesville, Ohio, built in 1943-1944, as recently reported in Engineering News-Record. The suit claims that specifications did not reveal the existence of large quantities of rock and shale at the airport site. On the basis of the specifications, the contractor understood there were not over 100 cu. yd. of rock, but in actuality, there were 233,000 cu. yd., in addition to 423,168 cu. yd. of hard shale. Samples of the rock and shale, which have been stored in a vault since 1944, have now been submitted as evidence: Specifications for the project were prepared by the Civil Aeronautics Administration. The contractor's bid on the airport project was $1,047,328.

* * * * * * * * *

Contract awards for heavy construction, nationally, totalled $7,961,606,000 for the first 30 weeks of 1952, compared with a total of $8,661,569,000 for the comparable period of 1951, as reported by Engineering News-Record. Private housing is leading all other types of construction in dollar volume, with a 30-week total of $1,785,500,000, or 56 percent above the same period in 1951. Industrial building and commercial construction dropped sharply during the latter part of the steel strike.

* * * * * * * * *

At least one-third of every dollar received last year by the Du Pont company, for all its products and services, wound up in the hands of the tax collector, as recently reported by the company, exemplifying what is typical of most industry of today. The company's direct liability for taxes and renegotiation on operating income amounted to $383,000,000 in 1951. (Total gross operating income was $1,546,000,000.) In addition, approximately 80,000 employes, who received their pay from that income, had some $46,000,000 withheld for taxes from their salaries and wages, not including additional personal income, excise, property and other taxes paid by these employes, nor the "hidden" taxes imbedded in the purchase price of most articles. Also not included in the above taxes, are the tax levies paid by the stockholders on the $90,000,000 paid in dividends to the stockholders. For every dollar of dividends Du Pont's stockholders received out of the income from sales and services, the tax collector received $4.25.

* * * * * * * * *

The recent steel strike, up to July 15, had caused a total national steel loss of approximately 11,500,000 tons, according to Business Week. The loss by the end of July, even though the strike had been settled, reached nearly 14,000,000 tons, which amounts to about seven weeks' output at capacity. If present "natural" demand were a theoretical 70 percent of capacity, it was estimated that it would take 20 weeks to make up the deficit.

* * * * * * * * *

According to a U.S. Chamber of Commerce report, federal taxes have increased 1072 percent in the past 12 years. The federal tax load for 1952 was said to amount to $1389 per American family, as compared with $1196 for 1945, at the peak of World War II tax collections, and as compared with $152 per family as recently as 1940.

* * * * * * * * *

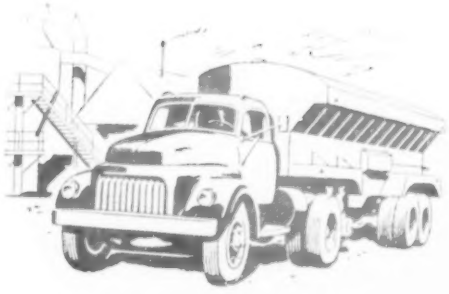
Hungry Horse dam in western Montana, which will be the world's fourth largest and third highest, is expected to be completed early this fall. In June, 152,877 cu. yd. of concrete were placed and when completed this fall, the structure will have approximately 3,100,000 cu. yd. of concrete and will be 564 ft. above bedrock. The first of four 71,250-kw. generators is scheduled to come on the line about October 1. The lake created behind the dam will store approximately 3,500,000 acre-ft. of water and will extend 34 miles upstream. This storage water will add about 600,000 kw. to power plants downstream on the Columbia river, according to the U.S. Bureau of Reclamation. Cost of the project is in excess of $106,000,000.

THE EDITORS

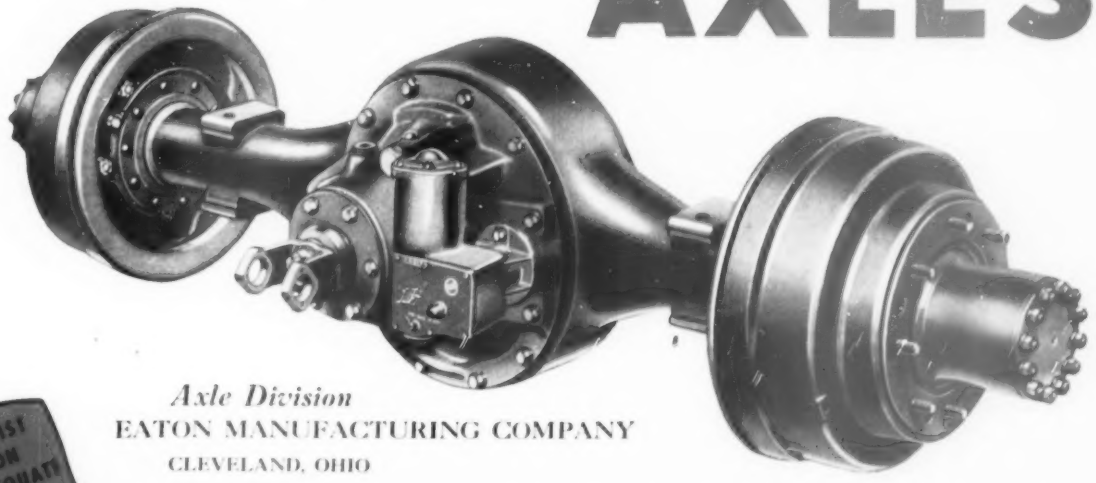
Eaton 2-Speeds cut hauling costs

Eaton 2-Speed Axles provide a gear ratio for every load and road situation: permit engines to run in the most economical speed range: reduce stress and wear on engines and power transmitting parts. This means lower cost right down the line: through reduced operating and maintenance costs, through faster trips, through longer truck life. And Eaton 2-Speed Axle trucks are worth more on the trade-in.

Let your truck dealer explain how Eaton's exclusive planetary gearing, forced-flow lubricating system, and positive shift control keep trucks on the job without expensive axle repairs.



EATON *2-Speed Truck* AXLES



Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

INSIST ON ADEQUATE ROADS

Today, America's roads are crowded with twice the traffic they were designed to carry. Help end the national traffic jam by speaking up for more and better roads.

BUCYRUS ERIE

6-YARD 150-B *Brings* NEW SPEED, POWER, CAPACITY

To Loading and Stripping

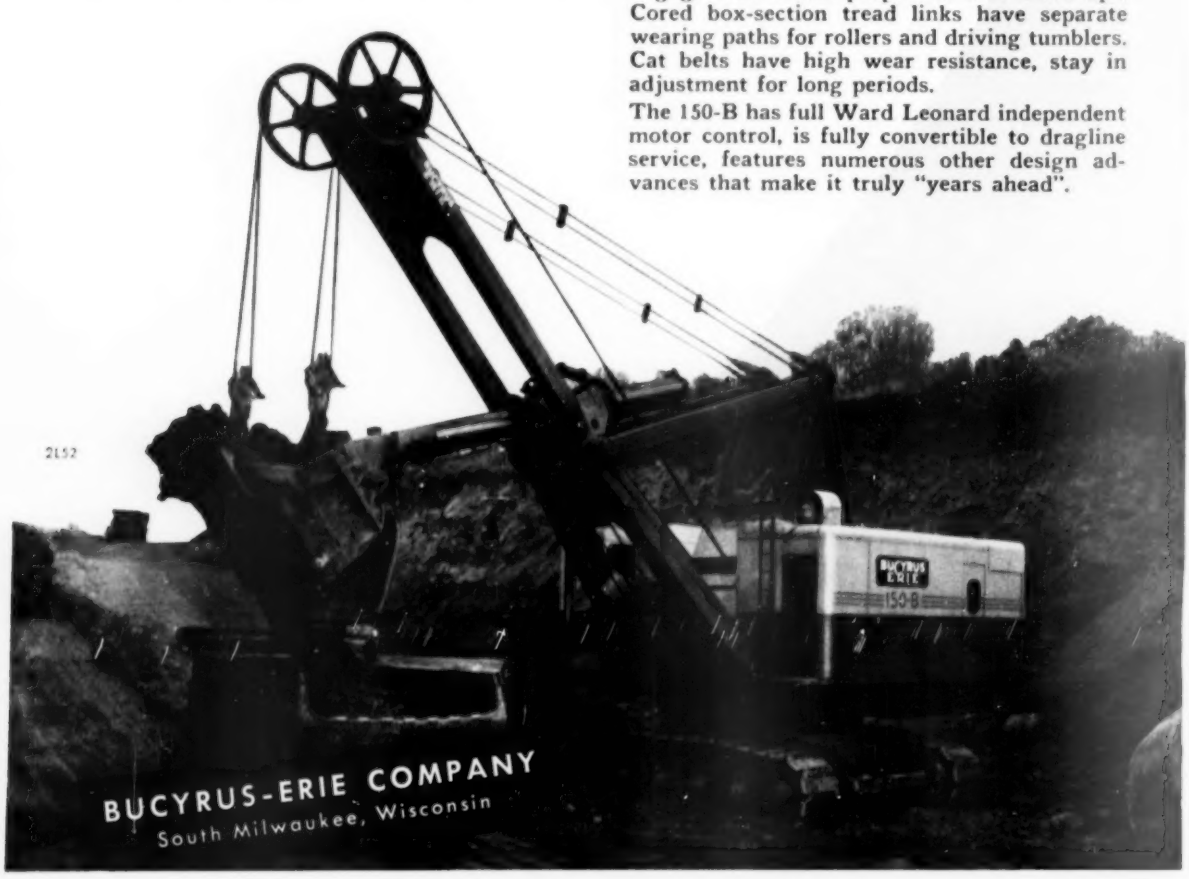
ADDED to the time-proved superiorities of design and construction which have made Bucyrus-Erie quarry and mining shovels traditionally "years ahead" are important features new to an excavator of this size, yet *thoroughly proved in the field*. Among these 150-B features are:

Exclusive Two-Section Boom with tubular dipper handle free to rotate in saddle block. Used with outstanding success on Bucyrus-Erie's large stripping shovels for many years, this design speeds the working cycle and permits increasing the payload because it reduces front end weight materially — yet provides enormous strength. Upper boom section carries only load resulting from pull of ropes, strong trussed lower section transmits directly to the revolving frame the vibrations, torsional and shock loads set up in digging. Rope crowd is quiet, positive, with crowd machinery located on the deck.

Powerful New Main Machinery designed for double twin hoist, smoothly delivers power where you want it, when you want it. Hoist machinery pulls dipper straight through tough banks with steady positive action. Fast smooth swing, with quick acceleration and deceleration, shaves seconds off every cycle.

Larger Stronger Mounting has new propelling machinery arrangement, which provides rapid engagement of the propel for fast move ups. Cored box-section tread links have separate wearing paths for rollers and driving tumblers. Cat belts have high wear resistance, stay in adjustment for long periods.

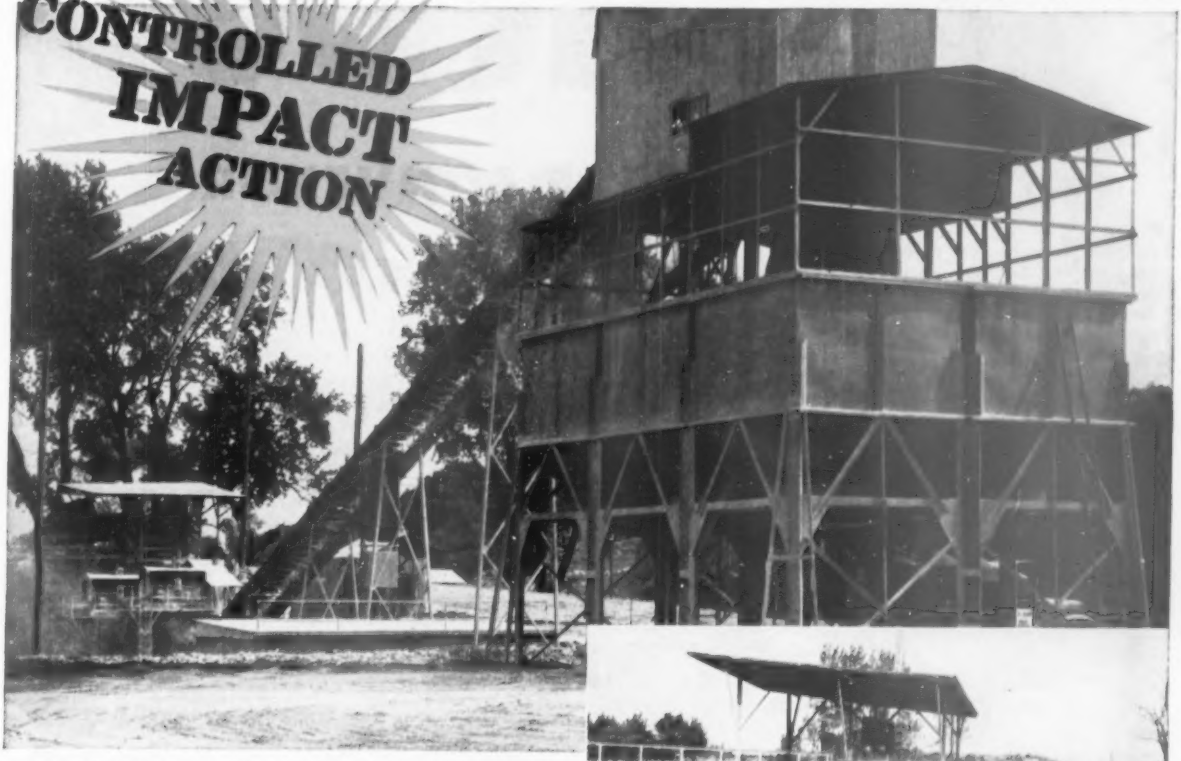
The 150-B has full Ward Leonard independent motor control, is fully convertible to dragline service, features numerous other design advances that make it truly "years ahead".



BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Fred Weber Jr. chooses

for Vigus Quarries Inc., Vigus, St. Louis



3240 PMCO Impact Master with 36" x 12' apron feeder, 30" discharge conveyor, Murphy diesel power. Output fed to vibrating screen over 30" plant conveyor.

TOP QUALITY AGGREGATE IN ONE PASS THROUGH PMCO IMPACT MASTER

Fred Weber Jr. has proof of PMCO Impact Master performance. He's producing 135,000 tons of top quality concrete aggregates to meet CAA and City of St. Louis specifications for airport runways.

Feeding with three trucks, Vigus Quarries Inc. are averaging 175 tph of crushed aggregates. That's 150 tph of specification material with 40% of 2½" down to 1¼", and 60% of 1¼" down to ⅛"; and 25 tph of base rock and aglime. Mr. Weber is enthusiastic about the performance. He says, "We've fed the Impact Master peak loads with additional trucks and we know it has the capacity to turn out 250-260 tph."

Top capacity with greater control over finished product size . . . that's what Controlled Impact Action gives you in the PMCO Impact Master. Its high ratio of reduction eliminates secondary crushers and auxiliary equipment and lets you step into big volume production with minimum plant investment. PMCO Impact Masters have capacities up to 500 tph. Write today for profit-making details on the size that meets your requirements.

Manufactured, sold and serviced by Impact Master Division, Universal Engineering Corp., 625 C Avenue N. W., Cedar Rapids, Iowa.

UNIVERSAL ENGINEERING CORPORATION Division of PETTIBONE MULLIKEN CORPORATION

625 C Avenue N.W., Cedar Rapids, Iowa
Phone 7105

4700 West Division St., Chicago 51, Illinois
Phone Spaulding 2-9300

MODEL 363

Barber-

PORTABLE CONVEYOR

Complete accessories are available to make the 363 Conveyor adaptable to the widest variety of operating conditions. It is shown here unloading a hopper car with a B-G 358 unloader.

HANDLES ALL MATERIALS: Sand, stone, gravel, wet concrete, chemicals, coal, etc.

UP TO 200 T.P.H. CAPACITY: Available in lengths of 25', 30' and 35', plain or cleated 24" belt.

NO CHAINS, NO SPROCKETS: Power transmitted from gear reducer through shaft to the head-end drive—sturdy, maintenance-free construction.

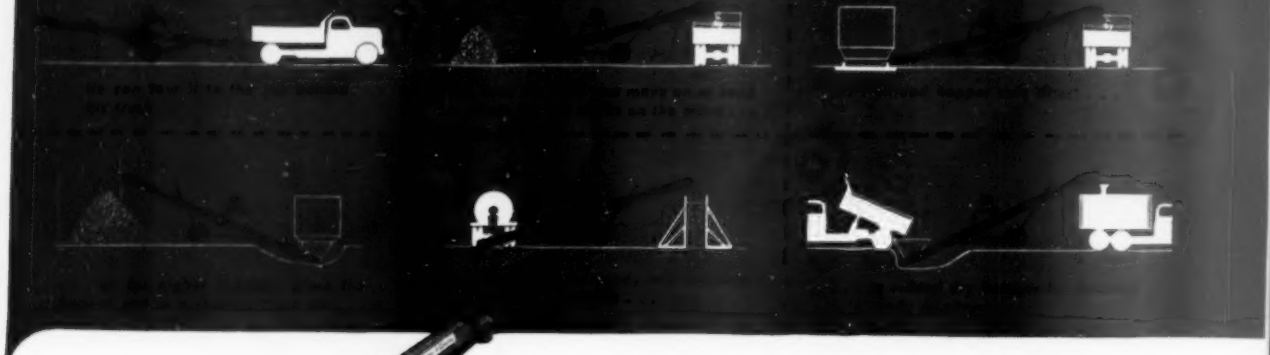
25 MILES PER HOUR TOWING SPEED: Pneumatic tires, coil springs, shock absorbers, convenient towing hitch.

RUGGED B-G CONSTRUCTION: Designed for maximum strength, minimum weight.

FULL SWIVELING WHEELS: For radial stockpiling as desired.

ALL PURPOSE: Built for contractors, material yards, concrete product plants; aggregate plants, gravel pits, City, County and State Highway Departments, etc.

SEE WHAT ONE MAN CAN DO...



For Those Smaller Jobs—the B-G 362

Here is the ideal medium-duty Portable with capacities ranging to 100 tons per hour. Designed to handle all materials, fully portable, the B-G 362 Conveyor is low in cost, yet has the usefulness in its capacity range of the heavier duty 363. Featuring B-G latest design with shaft drive, dust-sealed foot end, rugged B-G frame, etc., the 362 will give years of dependable low-cost service.

see your B-G distributor

Greene

MODEL 358

ALL MATERIAL CAR UNLOADER

FAST: Unloads hopper cars in 45 minutes!

VERSATILE: Unloads all types of bulk materials—gravel, sand, stone, coal, cinders, slag, ores, etc.

HIGH CAPACITY: Ranging up to 170 t.p.h. for material weighing 100 lbs. per cu. ft.

POSITIVE, NON-SLIP: Chain and belt are bolted together at cleats. Starts without slippage under full load.

PORTABLE: Shock absorbers, towing hitch, perfect balance allow 25 miles per hour road speed.

ONE-MAN OPERATION: Releases expensive crane clamshells, etc., for more productive work.

CHOICE OF POWER: Gasoline or electric with V-belt drive to speed reducer.

SEE HOW YOU CAN SAVE...

send for bulletins

These suggestions are only a few among many proved ways that modern, portable Barber-Greene Conveyors and Unloaders can help you combat high costs and the manpower shortage. For full information, write to the address below, or ask your Barber-Greene distributor.

High capacity combined with low-cost operation identifies the 358 Unloader. Economical enough for intermittent work, amply rugged for those continuous high-production operations.

Barber-Greene Company
AURORA, ILLINOIS, U. S. A.

Finger-tip gearshifting for heavy-duty

Allison TORQMATIC Transmission quick-shifts under load at full throttle—saves time—cuts operating and maintenance costs

PERFECT teammate for the famed Allison Torqmatic Converter is this Torqmatic Transmission — an exclusive development that takes the work out of gearshifting in even the largest off-highway trucks and heavy earth-moving vehicles.

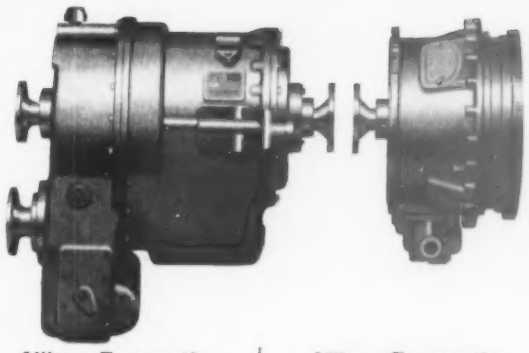
Embodying the same basic design principles as the Allison Torqmatic Transmission, which has long been used in U. S. armored vehicles, this Allison quick-shift transmission eliminates "gearshift guess"—puts an end to laborious clutch pedal pumping and the usual manual gearshifting.

Unlike conventional sliding-gear types, the Allison hydraulically controlled *Torqmatic* is a constant-mesh, planetary-gear transmission. With a simple flick of a lever, the driver can shift from one range to another *at full load without taking his foot from the throttle*—and without losing momentum.

A Smooth Power Flow

Coupled with the cushioning effect and automatic features of the Allison Torqmatic Converter, this transmission greatly extends the torque converter's capacity. This means that trucks up to 50-ton pay load can climb steep grades with the smoothness and operating ease you enjoy with an hydraulic transmission in your car. It cuts maintenance. It increases truck life. It reduces operator fatigue. It enables drivers to handle bigger pay loads on faster schedules. *It gets more work done at lower cost per ton-mile.*

SCRAPERS



Allison Torqmatic Transmission | **Allison Torqmatic Converter**

UNBEATABLE TEAM
—for maximum operating economy

Quick shifts under load at full throttle

Finger-tip hydraulic gearshift control

Combination needs only three forward speeds with one reverse

Power take-off available. Delivers full engine power

Variety of transfer gear ratios available

Simple design—one-piece cast converter elements—minimum maintenance

Compactness simplifies installation

Designed for power application in the 75 to 350 h.p. range

Longer equipment life—less wear on drivelines, axles, chains, sprockets and gears

A matched team—designed to work together smoothly—designed and built by one manufacturer

vehicles

Yes, here is the profit-winning team for almost any heavy-duty vehicle drive—tested in the world's toughest kind of service and proved by thousands of hours' operation in off-highway trucks, tractors and other heavy equipment. For further information about TORQMATIC DRIVES, write to:

Allison Division of General Motors,
Box 894R, Indianapolis 6, Indiana.

GM GENERAL MOTORS

Allison

TORQMATIC DRIVES

TRACTORS

TRUCKS

CRANES

SHOVELS

LOCOMOTIVES

DRILLING RIGS

PROFITABLE PERFORMANCE ...TODAY AND TOMORROW

Rear-Dump "Eucs" range in capacity from 10 to 34 tons... top speeds loaded up to 36.3 m.p.h.... diesel engines of 125 to 400 h.p.

Bottom-Dump "Eucs" are powered by diesel engines of 190 to 300 h.p.....range in capacity from 13 to 25 cu. yds. struck... top speeds loaded up to 34.4 m.p.h.

Euclids are engineered and built for long life and dependable performance in off-the-highway service. Their rugged staying power is a major factor in assuring low cost production on a wide range of jobs.

Some of the reasons for the outstanding performance of Euclids are ample power and traction for steep grades and tough roads, fast travel speeds with large capacity payloads, less down time and low maintenance and operating costs.

Whether you are building dams, levees, airports or roads, or moving material in open pit mines, quarries or industrial work, get in touch with your Euclid Distributor. He can show you how to get more loads per hour at more profit per load.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

EUCLIDS

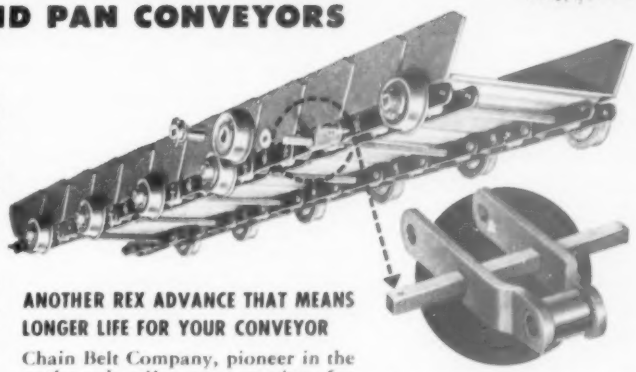
HOT STUFF

IS EASY WITH REX® APRON AND PAN CONVEYORS

When it comes to transporting hot bulk materials, there is virtually no upper limit to the temperatures the rugged, heavy-duty Rex Apron and Pan Conveyors can stand. Several now in operation are handling material up to 1900° F. Hot sinter, hot clinkers, hot lime, hot castings—these and many other "hot" items are all in a day's work with Rex Apron and Pan Conveyors.

Rex Conveyors will handle jobs where other types such as shaker conveyors and steel belts are useless. They have high capacity, require very little maintenance and operate at very low cost. Wearing parts are specially hardened. Chain is located away from high heat zone. Graphite impregnated grease is used throughout. When heat softens grease so that it flows, graphite remains to do lubricating job. With Rex, you are free from worry about premature failure and consequent costly down time or repairs.

For all the details write to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.



ANOTHER REX ADVANCE THAT MEANS LONGER LIFE FOR YOUR CONVEYOR

Chain Belt Company, pioneer in the outboard roller construction for apron and pan conveyors, has now developed another new feature which can add years to the life of your conveyor—the square through rod. This exclusive Rex feature makes it impossible for the rod to rotate in the side plate. This means longer life for your conveyor *3 ways:*

1. Through rod breakage is eliminated
2. Side bar failure due to enlargement of attachment holes is eliminated
3. Bushing life is greatly lengthened.

CHAIN BELT REX COMPANY

Chain Belt COMPANY OF MILWAUKEE

Atlanta • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland
Dallas • Denver • Detroit • El Paso • Houston • Indianapolis • Jacksonville
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HD-5
40 drawbar hp.
11,250 lb.

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72 drawbar hp.
18,800 lb.

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109 drawbar hp.
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*Editor's page . . . .

Steel prices and their effects on plant additions

SETTLEMENT OF THE 54-DAY steel strike on July 25 will have long-lasting economic effects on industry and construction, and it has immediate competitive significance.

The combination of price rises granted the steel companies, including those permissible under the Capehart Amendment to the Economic Controls Act and to cover wage and freight rate increases, total $5.20 a ton for basic carbon steel, which is the type of steel generally used in construction.

Steel fabricators have this price rise passed on to them and many must also pay the increase in steelmakers' wages which amounts to more than 21 cents an hour with fringe benefits included. Thus, their labor costs have gone up 12 percent and the result likely will be about $12 a ton increase for fabricated steel which is permissible under ceiling price regulations.

Plant Expansions

The effect on costs of plant additions will be quite considerable in the rock products industries among others, which require heavy investment—principally steel—whenever an expansion program is undertaken.

In recent years it has been a difficult decision for companies in these industries to plan for expansion. Past experience had certainly provided good reason for conservatism. Over-expansion in the twenties had resulted in production capacity something like double the demand for cement and related products for construction, and this condition lasted for many years.

With booming demands in excess of productive capacity the past several years, there was a time lag before many individual producers yielded to the pressures of customers and became convinced that the long-time outlook for construction justified adding to plant capacity. Those which took the gamble in the late 1940's did so at a time when prices for machinery and plant construction costs were at an all-time high.

As it turned out, costs for added capacity did not decrease, as many thought they might, but continued upward and the decision to expand proved fortunate. Those which undertook additions in 1950 and 1951 were penalized further by rising costs because they chose to be more conservative. Now it turns out, because of the rises in steel prices to take effect, that those who went ahead in 1950 and 1951 with plant additions were probably wise, provided the construction boom continues.

Companies which recently undertook plant additions are certainly better off than those who will find it necessary to expand at prices further inflated because of the steel strike. And new producers entering the field will find themselves at a competitive disadvantage, other considerations being equal.

Construction

The wisdom of high-cost expansion is, of course, tied to the continuation of the construction boom which, until at least the middle of next year, seems assured to continue its record-setting pace. Shortages of structural and reinforcing steel may have a temporary adverse effect but the long-range outlook is favorable. In terms of dollar expenditures, this year may well end up as the best construction year yet. We are now halfway through the three-year program for building up military strength and the industrial mobilization base, and it appears that dollar volume of construction in 1952 and 1953 will top earlier estimates.

Looking further into the future, the need for all classes of construction will continue for many years to exceed anything this nation has ever experienced. It has been predicted by the President's Materials Policy Commission that the volume of building construction 20 years from now will be one-third greater than in 1950 which certainly will justify the wave of plant expansion that has been underway. The needs will be widely dispersed into all areas, which is essential for the stability of the rock products industries.

Financing for construction, and not the need, is the problem. Dollar volume records of construction at today's prices are misleading. They might be at all-time highs while physical volume is actually going down because the construction dollar, for highways as an example, will buy only half as much roads as it did ten years ago.

Recent action of Congress in appropriating a record sum for federal-aid highways for the fiscal years 1954 and 1955 indicates that the problem of finance is to be met. The bill was passed when Congress was under unprecedented pressures to cut government expenditures, which it did, while granting the highest suggested amount for highways.

Bror Nordberg

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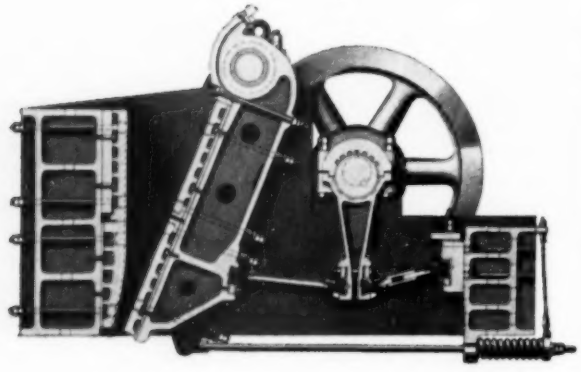

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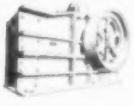
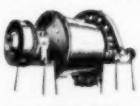

Jaw Crushers

Gyratory Crushers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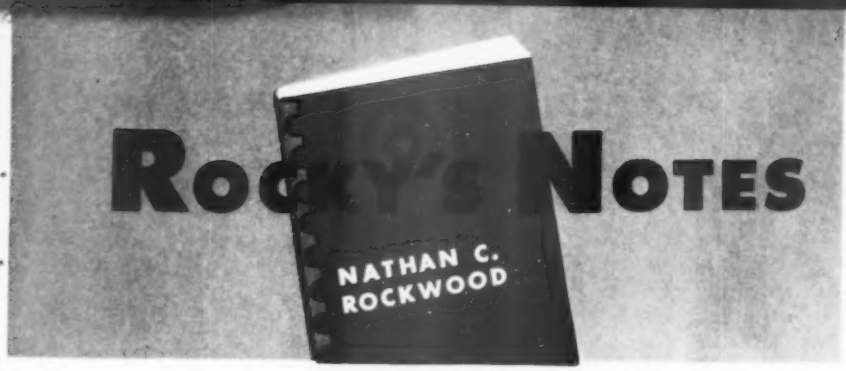

Complications in structural chemistry of portland cement and concrete

THE ARTICLE ELSEWHERE in this issue on "Prospective Chemistry of Cement and Concrete" has already accomplished one thing. It has convinced the writer that any investigation of the chemical structure of portland cement clinker is going to be extremely complicated. The cement research specialists who have all along emphasized the difficulties of their task haven't been fooling. It may be that a better knowledge of the structure of the chief components of portland cement will permit manufacturers to make a product to give better concrete by present methods; but it seems to us it can also lead to accomplishing the same results by other methods, not now even dreamed of.

Regardless of what the chemical structure of portland cement clinker may be, the objective to be attained in the processing of the raw materials to make clinker is to get an unbalanced or unstable artificial mineral in which the combining capacity of some of the cations is temporarily stretched to hold more of the anions than they have a right to. Expressed in other words, the capacity of the positively charged ions to provide chemical reactions with oppositely charged (negative) ions has not been fully satisfied. The unstable structure of the clinker has stored-up energy, much as a coiled spring has energy. In the case of portland cement clinker the energy is supplied by an excess of lime (CaO) temporarily restrained by its method of coordination in a silica and alumina framework or lattice. In clinker, reduced to fine powder, so that water has ready access to many parts of the structure quickly, this temporarily *combined* lime hydrates.

Since no limestone is ever going to be free of impurities, which include many elements other than carbon, oxygen and calcium, and since the clay or shale contains many other elements than silicon and aluminum, it is obvious that we can never process commercially pure CaO, SiO_2 and Al_2O_3. Those other elements are bound to influence the stability of the clinker structure. Should the aim be to make it more stable or less so? If the object is the most unstable mineral, one that will disintegrate quickly and completely with the addition of water, why should not certain elements that might influence the purpose be deliberately added, or subtracted? If the object is a slower reacting mineral combination or one that will never completely hydrate or disintegrate entirely, perhaps other means than using less lime are possible—provided so much lime is desirable for other reasons. Even the uninitiated can see that when the structure of hydraulic cement is really understood it may lead to some revolutionary production ideas.

What For Cement?

All this as to the chemical structure of cement clinker is to the good, and doubtless some day will permit us to have better, or at least more uniformly reliable cement. But it is doubtful if cement manufacturers will in the present generation be able to revise manufacturing processes, or refine raw materials, so as to make clinker that will conform even approximately to a designed structural formula. And that formula is going to be so complicated that it will take an expert in physical or structural chemistry not only to develop but to interpret it. Any genuine search for scientific truths is to be highly commended; and it would appear from texts on inorganic structural chemistry that cement scientists have not yet made their fair share of contributions to the general subject, or to geochemistry and mineralogy.

Yet to the inevitable "practical" mind the question is bound to arise, what is accomplished by the accumulation of so much intricate scientific data, which very few people are capable of understanding? Some good hydraulic cement was made 2000 years ago in the days of the Roman Empire. The engineers and architects of that day were well versed in cut-and-try methods; and they lit upon combinations that gave them what they wanted. By the same reasoning, it appears that instead of suspending experiments in cut-and-try methods of making cement and concrete until the scientific facts of chemical structure have been established, both users and manufacturers should redouble their efforts in experimenting with their own materials, and different methods of processing them, to make more satisfactory products. One thing that research on the structural chemistry of clinker seems bound to prove is that there is not, and probably never will be, such a thing as a standard portland cement in a chemical sense.

Proof in the Pudding

While the kind of research described will probably result in our knowing why cements are different, and why some give better results for certain purposes than others, users of portland cement will still be faced with the issue that the "proof of the pudding is in the eating." And in the "eating" it is the concrete that counts, regardless of what the cement ingredient is or how it is made. We think that means that we will be but little nearer the perfect concrete, after the structural chemistry of cement is worked out, unless parallel studies are conducted on the structures of certain aggregates which are notorious for making poor concrete. When it is established what those structural chemical defects are that lead to concrete disintegration, engineers can go about correcting the defects either with special types of cement, as seems to be the trend today, by additions to the mix, or by actual processing of the aggregates themselves, when there is no substitute for their use.

For example, there is a world of development in sight for silicones. Silicones are combinations of silicon, carbon, hydrogen and oxygen, in which the tetrahedra of oxygen ions, about a single ion of silicon, as in silica, are partly replaced by CH_3 radicals. Thus, one or more O's of the tetrahedra are replaced by CH_3, in which the Si ion is directly linked to the C of CH_3 by a valency bond (that is where an electron of the silicon and an electron of the carbon are shared, just as in SiO_2 an electron of Si and an electron of O are shared). Whereas the single remaining negative valency in each O of the tetrahedra of SiO_2 readily takes on a water or a hydroxyl ion, the $Si\text{-}CH_3$ combination repulses water and hydroxyl ions. This makes the silicones hydrophobic (water-hating) and silica hydrophilic (water-loving).

Silicones are expensive to manufacture today, but progress may simplify and cheapen the processes. In any event it apparently requires very small amounts of a silicone to render siliceous materials like concrete water repellent. One of the newest of these silicones has recently been announced by General Electric Co., which is actually water soluble yet dried out and exposed to the CO_2 in the atmosphere precipitates an insoluble silicate and makes a water repellent surface on most any material, or it can be used as an integral mix, it

(Continued on page 110)

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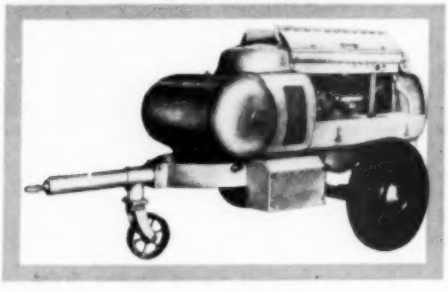

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LABOR RELATIONS TRENDS

New court decisions on coverage of wage-and-hour laws in rock products industries

By NATHAN C. ROCKWOOD

TWO RECENT COURT decisions on the extent to which the Fair Labor Standards Act applies to producers of rock products construction materials, used locally, are of considerable interest, although they tend to complicate our understanding of the law's coverage rather than clarify it. One of these decisions was made by the Pennsylvania State Supreme Court, Eastern District, June 24, 1952, in the case of Thomas vs. Hempt Brothers; it involved the coverage of an employe who supervised delivery of ready-mixed concrete for construction work on highways. The other case was decided July 17, 1952, by the U.S. Court of Appeals, 8th district, St. Louis, Mo., Tobin, etc. vs. Johnson et al., doing business as Bramhall Co.; it involved the U.S. Secretary of Labor's claim about production of crushed stone, sold locally to purchasers who used it locally for maintenance and improvement of highways.

Hempt Bros. Case

The plaintiff in this case was an employe of the defendant producer, who lost his case in the lower Court of Common Pleas of Cumberland county, Penn. The quoted text following here is taken from the decision of the Pennsylvania Supreme Court, referred to in our opening paragraph:

"The complaint averred that the defendant, Hempt Brothers, is a partnership engaged in the stone quarry business with its principal place of business in Camp Hill, Penn.; and that, during the period of time covered by the complaint, the plaintiff worked for the defendant in producing, processing, weighing and mixing sand, stones and cement and loading trucks containing concrete, giving directions to truck drivers as to the place of delivery daily of truckloads of sand and cement (concrete) to various customers of the defendant. The customers were the Pennsylvania Turnpike, the Harrisburg Municipal Airport, the Pennsylvania Railroad Company, the U.S. Army Depot and the U.S. Navy Depot, all of which are located within the State of Pennsylvania.

"The complaint further averred that, during the specified period, orders received by the company for concrete were communicated each day to the plaintiff who secured the proper number of trucks to haul the requirements of each order and was in charge of the mixing process whereby various types of concrete were processed; that he gave instructions to each mixer operator as to when to begin operation of his mixer so as to produce the material called for by the various orders; and that, when this process was completed, he filled and loaded the trucks and dispatched them to the indicated customers. The complaint does not contain any averment that the materials processed, handled or dispatched by the plaintiff either originated or were delivered outside of Pennsylvania; however, it is readily conceded that the defendant's customers maintained facilities for handling persons or property moving in interstate commerce.

"The question involved is whether the complaint states a cause of action within the provisions of the Fair Labor Standards Act. The answer depends upon whether the plaintiff, in the performance of the duties of his employment, was engaged 'in commerce or in the production of goods for commerce' as contemplated by Sec. 7 (a) of the Act."

The Court's decision then proceeds to review the arguments and decisions in various Federal Court decisions in similar cases, placing particular emphasis on the difficulty of drawing the line between State and Federal jurisdictions. The point is made that "it is the *employe's* activities in the course of his work and *not* the character of his employer's business that determines whether the employe is engaged in commerce or in the production of goods for commerce." Here the court quotes various decisions of the U.S. courts, which make the decision in this case valuable to attorneys on both sides of similar controversies, since the review appears to be quite comprehensive. From this review the Pennsylvania Supreme Court decided that the plaintiff in this case was *not* engaged in commerce within the meaning of the Act.

The next point to be decided was whether the plaintiff was engaged "in the production of goods for commerce." On this point the court's decision reads in part:

"In the present instance, the stone was quarried locally for local use. True enough, as a part of a concrete aggregate, the stone became imbedded in interstate transportation facilities, but it never moved in interstate commerce nor became a part of commerce. The fact that the workmen who applied the concrete to the maintenance of the interstate instrumentalities may have consequently been 'in commerce' did not constitute the 'off-the-road' employes, who prepared and delivered the concrete, producers of goods for commerce. So concluding, we could leave the matter here were it not for a recent decision of the Court of Appeals for the Third Circuit (Tobin vs. Alstate Construction Company) [see ROCK PRODUCTS, August, 1952].

"In the Alstate case, supra, the defendant employer made, distributed and applied amesite, a bituminous product used in resurfacing roads. Some of the component materials came from outside the state, but all of the product was compounded, delivered and used within the state, about 85 percent of it being used in the maintenance and repair of interstate highways. The defendant employer conceded that those of its employes who applied the amesite to the highways were covered by the Act, being "engaged in commerce." The defendant contended, however, that those of its employes who hauled the materials to the amesite plants, those who worked in the compounding plants and those who delivered the amesite from the plants to the defendant's various customers were not 'engaged in commerce' and, therefore, were not covered by the Act. The action in the Alstate case was by the Secretary of Labor for relief against alleged violations of the Act by the defendant with respect to the employes just indicated. The District Court, apparently being of the opinion that they also were engaged 'in commerce,' issued an injunction restraining the defendant from cognate violations of the Act."

Employer Wins

The Pennsylvania Supreme Court here discusses the Alstate case at considerable length, and the more or less contradictory decisions in similar cases, including the Schroeder case, the Oklahoma quarry operator, with which readers of this page are familiar from previous articles.

In conclusion the Pennsylvania Supreme Court's decision reads:

"Finally, we accept the inference drawn in the Schroeder case that 'If Congress had intended to extend the coverage of the Act to employes engaged in the production of goods for a railroad or other instrumentality of interstate commerce, even though the goods were not to move in commerce, it certainly would have employed apt words to express the intention.' This view later received congressional confirmation: see Conference Report on Amendments to the Fair Labor Standards Act, 81st Cong. 1st Sess., 1949, U.S. Code Congressional Service, Vol. 2, pp. 2251, 2252-2254, where the Schroeder case was specifically treat-

(Continued on page 110)

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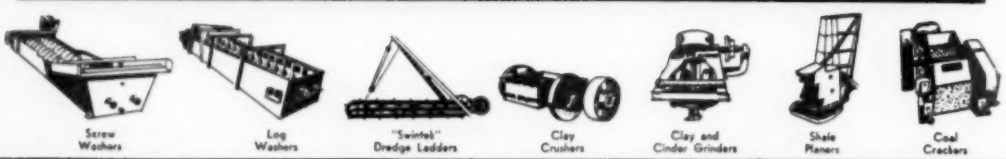

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PEOPLE in the news

Technical Service Manager

L. A. BARRON, engineer with Vermiculite Institute, Chicago, Ill., has been named manager of the new technical service department, according to an announcement by E. R. Murphy, managing director. The new department was created to do liaison work between the vermiculite industry and allied fields, as well as with governmental agencies and departments. Mr. Barron has been with the institute for the past three years. He attended Illinois Institute of Technology where he specialized in architecture and mechanical engineering. James Spence, a graduate in engineering of the Illinois Institute of Technology, has been named to succeed Mr. Barron. He will concentrate on building codes and represent the institute on some A.S.T.M. committees, taking care of inquiries and general work. Previous to his appointment with the institute, Mr. Spence was with U.S. Gypsum Co.

Sales Representative

HENRY W. GABBE, who in recent years has served Maryland and Washington consulting engineers as resident field engineer on construction projects in the area, has been appointed sales representative at the new Jessups, Md., plant of Universal Concrete Pipe Co., Columbus, Ohio, where he will handle engineering design and sales of the firm's complete line of manufactured concrete products.

Executive Sales Engineer

SCHAEFFER E. SPECHT, former design engineer for Penn-Dixie Cement Corp., Nazareth, Penn., has been appointed executive sales engineer in the New Jersey, Pennsylvania and New York cement plant area of the Research Corp., New York, N.Y. Mr. Specht began his career in the cement industry as plant engineer for C. K. Williams & Co., Easton, Penn., and as design engineer for Penn-Dixie Cement Corp. in Nazareth, Penn. While with Penn-Dixie, he participated in the design and construction of the plant at Penn Allen, Penn., and in the rehabilitation of the plant in West Winfield, Penn. Mr. Specht attended Lafayette College and Penn State College. He will make his headquarters at the company's plant in Bound Brook, N.J.

Appointed Director

JOHN C. BOLINGER, JR., assistant to the president of Lehigh Materials Co., a subsidiary of Lehigh Navigation Coal Co., Inc., Lansford, Penn., has been appointed a director of the company and vice-president and manager of Lehigh Materials Co., according to an announcement by Evan Evans, president. A native of Knoxville, Tenn., Mr. Bolinger was graduated from the University of Tennessee and the Harvard Graduate School of Business Administration. He was a captain in the U.S. Army Infantry and served with General Patton's Third Army for 20 months in Europe.

Named Vice-Presidents

J. T. MOGAN has been appointed vice-president of materials, production and sales, Standard Paving and Materials Ltd., Toronto, Ont., Canada, and E. Birdsall has been named vice-president of paving and construction. J. H. Reid has been made vice-president of finance. Mr. Mogan is responsible for production at the four sand and gravel plants of Consolidated Sand and Gravel Ltd., a subsidiary of Standard Paving and Materials Ltd.

France Honors Henry J. Kaiser

THE REPUBLIC OF FRANCE recently bestowed Knighthood in the Legion of Honor upon Henry J. Kaiser, president of Permanente Cement Co., Oakland, Calif., at an international and civic presentation banquet conducted by the Oakland Chamber of Commerce. More than 1000 persons attended the affair. In conferring the title of Chevalier (Knight) and the Cross of the famed Legion of Honor, Roger Seydoux, Minister Plenipotentiary of France, paid tribute to Mr. Kaiser as the "greatest builder of modern times," and "one of the greatest industrialists and symbols of the industrialization of the West." Mr. Kaiser declared that freedom, released for mankind by the American and French revolutions, opens up unlimited opportunities, but he warned that needless fears stop individuals and a nation from realizing their potentialities. He forecast victory in the war for freedom and envisioned the coming of lasting peace and the greatest age of mankind.

Executive Engineer

DONALD R. GUTHRIE has been appointed executive engineer in charge of engineering research for Minnesota Mining and Manufacturing Co., St. Paul, Minn. He will organize an engineering research group consisting of three sections—chemical engineering, machine development and instrument engineering—to provide engineering assistance to engineers in the various product divisions. Mr. Guthrie, who received his degree in chemical engineering from the University of Iowa, joined the company in 1939 as a research chemist, and was made a division engineer in 1944.

E. Birdsall

J. T. Mogan

J. H. Reid

Left to right: Mr. and Mrs. George F. Pettinos and George F. Pettinos, Jr. Mr. Pettinos, Sr., is celebrating his 90th birthday in September

Pettinos Celebrates 90th Birthday and 60th Year as Head of Sand Company

GEORGE F. PETTINOS, SR., president of George F. Pettinos, Inc., Philadelphia, Penn., celebrates his 90th birthday on September 20, and also the 60th anniversary as active head of the company he formed in 1892 to supply the metal working industry with industrial sand and graphite products.

Mr. Pettinos was born in San Francisco in 1862 and after attending Dickinson College and graduating from Lehigh University as a mechanical engineer in 1887, he was employed by what is now Bethlehem Steel Corp. as chief engineer for five years prior to forming his own company. He is president of Bridgeton Sand Co., Cape May Sand and Gravel Co., Reading Sand Co., A. T. Harris Sand Co., and Pettinos New England, Inc., all of which are engaged in the production of industrial sand. He is also president of a Canadian subsidiary, George F. Pettinos (Canada) Ltd., and Keystone Parting Co., manufacturer of waterproof powdered parting compounds for the foundry industry. In addition, he is also president of Sonittep Transportation Co., which has been engaged since 1916 in coastwise and inland waterway operation of a fleet of diesel-powered tugboats.

He is one of the founders of the American Foundrymen's Society, a life member of the American Society of Mechanical Engineers, a member of the Franklin Institute, American Ceramic Society, The Engineers Club of Philadelphia, Academy of Natural Sciences, The Contemporary Club and Lehigh University Club.

Mr. Pettinos is at his desk every day and is much opposed to the practice of retirement at the arbitrary age of 65, believing rightly that age is a state of the mind and is not predicated on the number of years one has lived.

Association Officers

HARRY A. BARNEY, vice-president and general manager of Barney & Dickinson, Inc., Willow Point, N.Y., has been elected president of the Empire State Sand, Gravel and Ready-Mix Association. Leon H. Wendel, Lockport, has been elected vice-president; John B. Hopkins, Albany, treasurer; and William Nass, Syracuse, secretary.

Receives Honorary Degree

CHARLES R. WATERS, district engineer in charge of the Buffalo office of the New York State Public Works Department, recently received an honorary degree of Doctor of Engineering from his alma mater, Union College, where he received his baccalaureate degree in 1907. Mr. Waters has been employed by the state since his graduation and has been district engineer since 1926. In addition to directing work of the department in western New York, he is a representative of the American Association of State Highway Officials' group which establishes standards for traffic control devices. Known nationally as an expert on highways, Mr. Waters is author of numerous published articles on highway construction and related subjects, and is a frequent speaker at conventions on these matters.

Plant Manager

JOHN C. JONES, of Alexandria, Ind., has been appointed manager of the Long Beach, Calif., building products plant of Johns-Manville, New York, N.Y. He succeeds the late J. M. Bollinger who died recently. John A. Carey continues as plant manager of the industrial products division in Long Beach. Mr. Jones joined the company in 1937 as a draftsman in the rock wool plant at Alexandria. Later he became production foreman and then industrial engineer. He has been supervisor of the industrial engineering department at the Alexandria plant since 1947.

Sales Managers Retire

PIERRE A. KYPKE, assistant sales manager of the Minneapolis office of Universal Atlas Cement Co., New York, N.Y., and Joseph R. Lair, district sales manager of the Indiana-Michigan territory, have retired after 44 years and 37 years of service, respectively.

Mr. Kypke, a native of Waterloo, Wis., received his B.A. degree from the University of Wisconsin in 1908. After graduation he joined the Minneapolis office to represent the Universal Portland Cement Co., which later became Universal Atlas Cement Co. During the first six years he traveled throughout Minnesota, North and South Dakota, Wisconsin and Michigan, and following sales work in the Minneapolis office he became assistant sales manager in 1939, which position he has held until his retirement. Mr. and Mrs. Kypke will reside in Jacksonville, Fla.

Mr. Lair began his career as salesman with Universal Atlas in 1915, and served in Iowa, southern and western Illinois, Nebraska and Indiana. Transferring in 1927 to the Chicago office, he served there in various capacities as assistant city sales manager, assistant district sales manager, metropolitan Chicago sales manager and Indiana-Michigan district sales manager.

Auwell Fogarty, assistant district sales manager, has been named to succeed Mr. Lair as district sales manager. He is a graduate of Lake Forest College in Illinois. He joined Universal Atlas in 1939 as clerk in the Chicago office and became a salesman in the Des Moines territory in 1940. After three years' service in the U.S. Navy, he rejoined the company as salesman in the metropolitan Chicago territory. In 1948, he was appointed assistant to the vice-president, sales, Western region, and in 1951 became assistant district sales manager, Indiana-Michigan territory.

Heads Safety Division

JAMES WESTFIELD has been appointed chief of the Health and Safety Division of the Bureau of Mines, Washington, D.C. He succeeds J. J. Forbes, who was named director of the Bureau of Mines last November. Mr. Westfield received his B.S. degree in mining engineering from the University of Utah in Salt Lake City, and had considerable experience in rescue and recovery work at coal-mine disasters and in metal mine safety work before joining the Bureau of Mines in 1928.

On Executive Committee

JOHN C. BEST, vice-president of National Gypsum Co., Buffalo, N.Y., has been named to the executive committee of the Buffalo Chamber of Commerce.

Resigns as Works Manager

ROBERT G. VERVAEKE has resigned as works manager of the Evans, Wash., plant of United States Gypsum Co., Chicago, Ill., to accept the position of vice-president of operations of the Quincy Corp., Quincy, Wash. Mr. Vervaeke was works manager of the Evans plant for the past eight years. Prior to that he was plant engineer at Evans, and plant engineer, geologist and kiln superintendent at the New Braunfels plant.

Traffic Manager

ARTHUR C. ROY has been appointed general traffic manager of Pennsylvania Glass Sand Corp., Pittsburgh, Penn. He was formerly traffic manager for Eastern Gas and Fuel Associates.

Elected Mayor

LAWRENCE A. BORGERT, president of L. A. Borgert Concrete Products, St. Cloud, Minn., has been elected mayor of St. Cloud.

Carter-Waters Promotions

W. E. BEANWAY has been appointed vice-president and general manager of The Carter-Waters Corp., Kansas City, Mo. Other appointments include C. W. Kulhavy, secretary and manager of special products; N. B. Smith, vice-president in charge of sales; P. J. Kirner, treasurer; J. E. Bethel, credit manager; R. E. Walker, manager of building material sales; J. E. Scroggs, manager of railroad and municipal sales; M. A. Brown, advertising manager; J. A. Porter, manager of sales service; H. R. Ambruster, director of purchases; R. L. Coleman, production manager, and J. R. Seibel, assistant production manager.

Receive Thompson Award

HARRISON F. GONNERMAN and William Lerch of the Portland Cement Association received the Sanford E. Thompson Award at the 50th anniversary meeting of the American Society for Testing Materials, held recently in New York, N.Y., in recognition of their outstanding technical paper on "Changes in Characteristics of Portland Cement as Exhibited by Laboratory Tests over the Period 1904 to 1950."

Mr. Lerch, administrative assistant in the P.C.A. research and development division, had previously received the same award at the 1947 A.S.T.M. meeting for his paper "The Influence of Gypsum on the Hydration and Properties of Portland Cement Pastes." He joined the Portland Cement Association in 1940 as an associate engineer and was appointed to his present position in 1947. Prior to joining the association, he held a P.C.A. fellowship at the National Bureau of Standards, Washington, D.C., for 15 years. He is a member of the American Concrete Institute and the American Chemical Society.

Mr. Gonnerman, assistant to the vice-president for research and development and a veteran of 30 years with the association, has twice received the Wason Medal of the American Concrete Institute for noteworthy research, and is past president and a former member of the board of directors of A.C.I. He is also a member of A.S.T.M., Western Society of Engineers, and the American Society of Civil Engineers.

Manages Phosphate Mine

HOWARD P. GOULD has been appointed manager of the phosphate mining operations in Bartow, Fla., of Swift & Co. He was formerly assistant manager of the New Orleans plant food division and succeeds D. M. Wright, who has retired.

Named Vice-President

HARVEY A. LEE has been appointed vice-president of Anchor Concrete Products, Inc., Buffalo, N.Y., in addition to his duties as secretary, according to an announcement by Frederick W. Reinhold, president. In his new position, Mr. Lee will be in charge of promotion and sales of all products manufactured by the company. He has been with Anchor since 1937, and was elected secretary and a director in 1938.

Executive Secretary

CLIFFORD V. TOBIN has been appointed executive secretary of the New York State Crushed Stone Association, Inc., Albany, N.Y.

Speaks on Concrete

CHARLES W. YODER, structural engineer in the Milwaukee, Wis., office of the Portland Cement Association, spoke on the subject of prestressed concrete at a recent meeting of the Western Chapter of the Wisconsin Society of Professional Engineers in LaCrosse, Wis.

OBITUARIES

RAYMOND C. YANT, president and owner of Yant Construction Co., Omaha, Neb., died recently after a short illness. He was 69 years old. Mr. Yant was also president of Concrete Products and Material Co., which was formerly headed by his son, Richard S., who died a year ago. Upon his death Mr. Yant assumed control of the firm and also of Douglas County Gravel Co., in which he and his son were partners.

GILBERT MARTIN SIBERT, manager of Allied Cinder Block Corp., Harrisonburg, Va., died recently at the age of 51.

EDWIN H. FOX, secretary-treasurer and general manager of Cincinnati Concrete Pipe Co., Cincinnati, Ohio, died July 13. He was 60 years of age. Mr. Fox was born in Toledo, Ohio, and attended the University of Michigan. He was president of the American Concrete Pipe Association in 1950 to 1951, and was currently serving on the board of directors. He was also president of the Concrete Pipe Associations, Inc., in 1950, 1951 and 1952.

JOHN P. SHEEHAN, chairman of the board of Atlas Lime Co., El Paso, Texas, and a director of the National Concrete Masonry Association, was

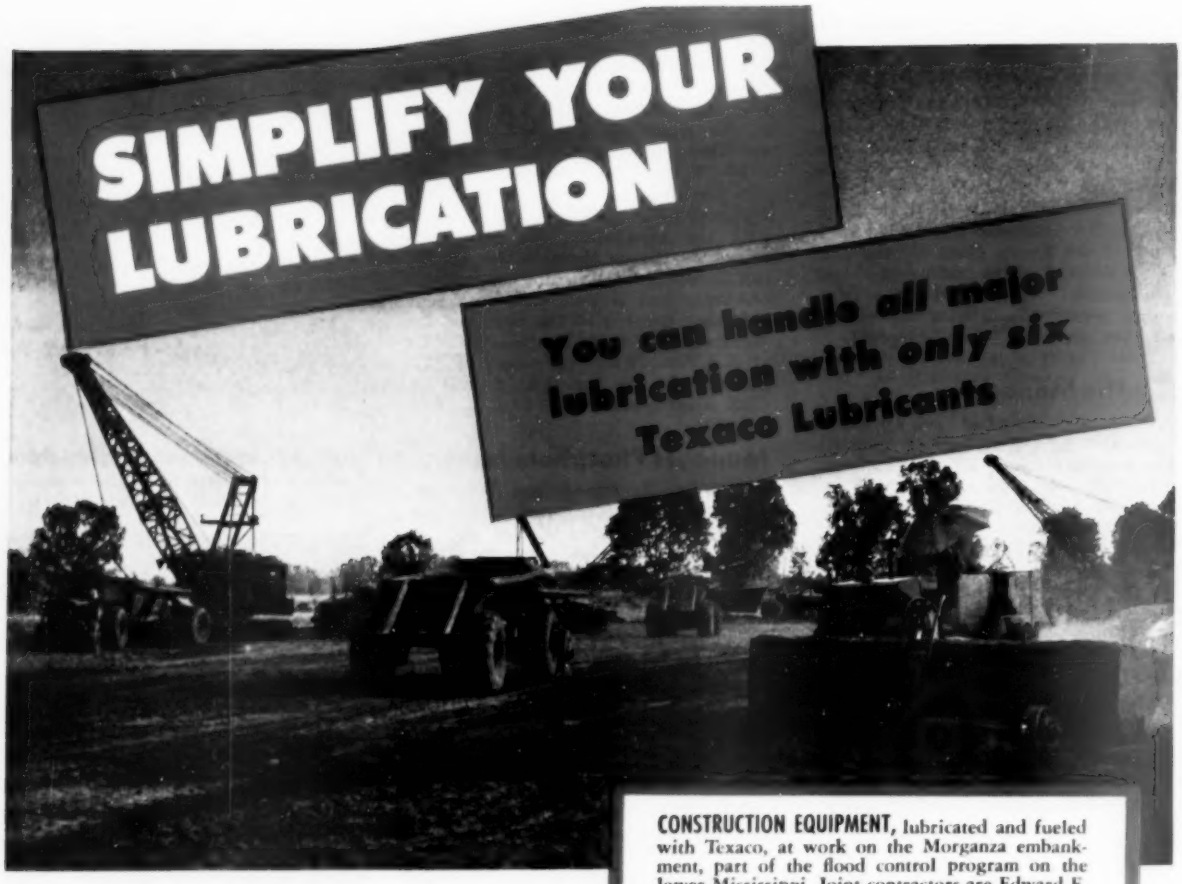
John P. Sheehan

killed July 22 when the car he was driving was struck by an eastbound Texas & Pacific freight train. Mr. Sheehan had been inspecting some buildings at the east end of the Atlas property just prior to the accident.

J. A. DUNAWAY, vice-president of Peery Lime Co., North Tazewell, Va., and a director of the National Lime Association for about 12 years, died recently.

LEO SCHUSTER, assistant traffic manager, Universal Atlas Cement Co., New York, N.Y., died recently after a short illness. He was 61 years old. Born in Paterson, N.J., Mr. Schuster joined the company in New York City as rate clerk in 1918, advancing to chief clerk in 1930. He was appointed assistant traffic manager in 1946. He was widely known in railroad and traffic circles throughout the New York-New Jersey area.

ROBERT CHARLES BOWERS, land commissioner for Cummer Lime and Manufacturing Co., Jacksonville, Fla., died recently. He was 70 years old. Born in Henning, Tenn., and a graduate of the University of Pennsylvania, Mr. Bowers had been associated with the company for 30 years.



CONSTRUCTION EQUIPMENT, lubricated and fueled with Texaco, at work on the Morganza embankment, part of the flood control program on the lower Mississippi. Joint contractors are Edward E. Morgan Co., Inc., and Jones & Gillis, Inc. Dirt-moving operations, started in June, 1949, call for placing 3,985,000 cubic yards of semicompacted embankment. Equipment includes 4 draglines, 9 tractors and 53 trucks—all of which are lubricated with Texaco exclusively.

Contractors in all parts of the country are saving time and money with the Texaco Simplified Lubrication Plan. They've reduced the dozens of competitive lubricants they formerly used to *only six* Texaco Lubricants—the few they need for all their major lubrication jobs. This not only saves time and work but—more important—it prevents confusion and costly lubrication errors.

6 Products Used in Texaco Simplified Lubrication Plan

1. ENGINE LUBRICATION: Use *Texaco Ursa Oil X**** for both heavy duty gasoline and Diesel engines. It's detergent and dispersive—cleans as it lubricates. Tops for protection against wear and rust. Reduces both maintenance costs and fuel consumption. **2. CHASSIS LUBRICATION:** Use *Texaco Marfak*. It gives longer lasting protection against dirt, rust and wear because it won't jar out, won't squeeze out. *More than 400 million pounds of Texaco Marfak have been sold!* **3. WHEEL BEARING LUBRICATION:** Use *Texaco Marfak Heavy Duty*. It seals out dirt and moisture, seals itself in—assuring longer bearing life, safer braking. No seasonal change required. **4. CRAWLER LUBRICATION:** Use *Texaco Track Roll Lubricant* for longer lasting protection against dirt, water and wear for lower maintenance costs. **5. AIR COMPRESSOR LUBRICATION:** Use the Texaco air compressor oil exactly suited to your particular operating conditions. Clean, efficient operation assured. **6. ROCK DRILL LUBRICATION:** Use *Texaco Rock Drill Lubricant EP*. Its "extreme pressure" and rust-inhibiting properties assure longer drill life.

Let a Texaco Lubrication Engineer give you full details of the Texaco Simplified Lubrication Plan—its advantages and economies for you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Lubricants and Fuels

Faithfully yours 50 *for Fifty Years*

TUNE IN: On television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

industry news

Quarry site to be converted to recreational area

Converts Quarry into Park

BASIC REFRACTORIES, INC., Cleveland, Ohio, large producer of dolomitic granular refractories, is converting its Bettsville, Ohio, quarry site into a public park and recreational area. The company first consulted with town officials and state and county health officers, and then permitted the Bettsville townspeople to select that portion of the company's property which they considered best for their park.

The 40-acre recreational area will include a 9-acre lake with a large, sandy beach, ball diamonds, picnic area and bathing facilities. The Bettsville townsfolk and many employes of Basic Refractories are working together on the park project, using air compresosrs, blasting tools, bulldozers, concrete mixers and 500 tons of dynamite, donated by the company.

Favorable Freight Decision

THE INDUSTRIAL SAND CASE, Docket 30524 of the Interstate Commerce Commission, has been decided in favor of the industrial sand industry. A summary of the case, written by the National Industrial Sand Association's counsel, states that the report of the commission holds that the present rates on sand in closed cars are unreasonable and prescribes a mileage scale for distances up to 300 miles, and also orders rates for distances over 300 miles reduced so as to include no greater increase in the aggregate than has been made on sand in open cars by Ex Parte 162 and later general increases. The order becomes effective October 24.

The decision upholds the industry's position by ruling that the original Industrial Sand Case relationships, which had been upset by the general increases, should be re-instated. These relationships were: for distances up to 200 miles, closed car rates not more than 15 percent higher than open car rates; for distances over 300 miles, equal rates for sand in closed and open cars.

The present rates and those prescribed by the decision (all being subject to the Ex Parte 175 increases) were listed by the association's counsel as follows:

Miles	Rates on sand in closed cars	
	Present	Prescribed
55	$2.08	$1.90
100	2.63	2.26
150	2.93	2.50
200	3.17	2.74
250	3.41	2.98
300	3.65	3.16
350	3.89	3.40
400	4.14	3.64
460	4.38	3.88
520	4.62	4.13

The scale rates in the final report are higher by 8-10 cents than those recommended by Examiner McGrath in his proposed report in the proceeding, but they still reduce present rates by 18 cents at 55 miles, 37 cents at 100 miles and 43 cents for the 150-, 200- and 250-mile distances. For distances over 300 miles, the final report's rates are the same as proposed by Examiner McGrath, providing reductions of 49-50 cents per ton.

The rules of practice of the commission, however, provide 60 days for the filing of a petition with the commission for re-consideration of the decision, in case the railroads desire to reopen the case.

Quartz Crystals

DISCOVERY OF A SIGNIFICANTLY large supply of quartz crystals in White Pine county, Nev., has been announced by government officials. The find was made on the Goshute Indian Reservation near the Utah border.

Huron Expansion

HURON PORTLAND CEMENT CO., Detroit, Mich., recently received government approval for the expansion of its Alpena, Mich., plant. Huron officials had been trying for months to get D.P.A. approval for the proposed expansion by submitting documentary proof that cement demand in the Great Lakes area far exceeded the supply. Certificates of necessity were finally granted after hundreds of letters from Huron customers, citing the acute cement shortage in the Midwest, were forwarded to D.P.A.

Expansion of the Alpena plant will include the installation of four additional kilns and new raw grinding mills, finish mills, clinker storage, dust collectors and other equipment necessary to take care of the increased production. The over-all increased production will be approximately 2,000,000 bbl. per year.

More than 800 men and women are presently employed in the Alpena mill which is claimed to be the world's largest cement plant.

Expands Slag Plant

STANDARD SLAG CO. has announced plans to double capacity of its slag crushing and screening facilities at Portsmouth, Ohio. The company purchased 80 acres of land in Porter Township for storage purposes and, in the future, is planning to build a river loading dock at the Wheelersburg stockyard. The new facilities will increase the output to more than 500,000 tons per year and will raise the capacity to 1600 tons a day.

Cover Picture

THE 666-FT. limestone carrier John G. Munson, largest self-unloader ever built for Great Lakes shipping, is now plying between Calcite, Mich., and lower lake ports. The ship is operated by U.S. Steel's Bradley Transportation Line of Detroit.

Launched last November at Manitowoc, Wis., the Munson underwent outfitting until its trial run on August 12. This $6,500,000 vessel is built to haul 20,000 gross tons of stone at 16 m.p.h. It was named in honor of the late John G. Munson, former U.S. Steel vice-president of raw materials.

Putting Convention Talk to Work

IT HAS COME TO OUR ATTENTION that two sand and gravel producers are making extensive use of some of the recent association convention speeches and are "spreading the gospel" to various parts of the country. These men felt that one of the speeches in particular was so timely and important that its message should be carried to all responsible American people and, in particular, to those of the industry who did not have the privilege of hearing the message delivered in person.

The speech referred to was made by Dean Clarence Manion, Notre Dame University, at the National Sand and Gravel Association convention, held last February in Chicago, Ill. The speech primarily concerned the preservation of private enterprise in our country which, many feel, is being seriously threatened today. It was a rallying speech, challenging the American people to recover unity and strength and join together in active support of the basic principles upon which our government was founded and to resist the trend toward accumulation and concentration of governmental power which "precedes the death of human freedom," and which eventually would also mean the stifling of private enterprise. As stated by Dean Manion, "The only way to revive liberty in this country is to decentralize, disintegrate and to demobilize this unlawful concentration of power in Washington. You cannot defeat despotism in Moscow by establishing despotism in Washington . . . You must drive government back in order to move liberty forward."

Consolidated Rock Products Co., Los Angeles, Calif., recently published excerpts of this speech in its company paper. F. J. Cloud, vice-president of W. R. Bonsal Co., Inc., Hamlet, N.C., has been using the text of Dean Manion's message as the basis of many speeches he has been making before civic organizations in his area. Both companies were so impressed with the importance of this message, that they felt it their civic and patriotic duty to pass the message on to help awaken industry and the American people to the present-day threat to the freedoms inherited by us from our forefathers who sought to give us a constitutional system which would truly be a "government of the people, by the people and for the people."

Crushed Stone Plant

MATOAKA STONE CO. recently opened a new plant near Bartlesville, Okla., for the production of crushed stone and agricultural limestone. Tom King is plant manager and Marshall Carr is sales manager.

Shown above (right) is the new design of the portland cement package now being used by Dragon Cement Co., Thomaston, Maine. (Old design is shown at left.) The new design features the company's trademark as the main element and designates the contents more clearly by arranging the copy for easier readability. The bag was designed by Union Bag & Paper Corp.

Sand and Gravel Plant

SCHULZ SAND AND GRAVEL CO., Neenah, Wis., recently began operations at its new plant near Appleton, Wis. The company supplies sand and gravel for contractors, ready-mixed concrete producers, firms and individuals in the Neenah-Menasha-Appleton area. In addition to its sand and gravel operations, the company is also building an asphalt plant.

Officers of the company are John Schulz, president; George Schulz, vice-president; and James Schulz, secretary-treasurer.

Buys Kaiser Gypsum

PERMANENTE CEMENT CO. stockholders recently voted approval by a vote of 1,226,322 to 6542 to purchase the business and assets of Kaiser Gypsum, a division of Henry J. Kaiser Co. The gypsum properties were transferred August 1, to a new wholly-owned subsidiary of Permanente Cement Co., to be known as Kaiser Gypsum Co.

Permanente stockholders also voted to merge the inactive subsidiary, Pacific Coast Cement Corp., into Permanente Cement Co.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 20,748,000 bbl. of finished cement in June, 1952, as reported to the Bureau of Mines. This was a decrease of 6 percent compared with the output in June, 1951. Mill shipments totaled 25,067,000 bbl., an increase of 1 percent from the June, 1951, figure, while stocks were 14 percent above the total for the same month in 1951. Clinker production during June, 1952, amounted to 19,950,000 bbl., a decrease of 6 percent compared with the corresponding month of the previous year. The output of finished cement during June, 1952, came from 155 plants located in 37 states and in Puerto Rico. During the same month of 1951, 21,327,000 bbl. were produced in 153 plants.

Coming Conventions

September 10-12, 1952—
American Concrete Institute, Fall Regional Meeting (jointly with Structural Division, A.S.C.E.), Conrad Hilton Hotel, Chicago, Ill.

September 15-17, 1952—
National Lime Association, Operating Division, Mountain Lake Hotel, Mountain Lake (Giles Co.), Virginia

September 22-25, 1952—
American Mining Congress, Convention and Exposition, Public Auditorium, Denver, Colo.

September 29-30, 1952—
National Sand and Gravel Association, Semi-Annual Meeting of Board of Directors, New Ocean House, Swampscott, Mass.

October 20-24, 1952—
National Safety Congress and Exposition, Conrad Hilton, Congress, Morrison and Sheraton hotels, Chicago, Ill.

January 18-21, 1953—
National Agricultural Limestone Institute, 2nd Annual Convention, Hotel Statler, Washington, D.C.

February 2-3, 1953—
National Concrete Products Association (Canada), 4th Annual Convention, King Edward Hotel, Toronto, Ont., Canada

February 2-6, 1953—
National Crushed Stone Association, 36th Annual Convention, Hotel New Yorker, N.Y., N.Y.

February 23-26, 1953—
National Sand and Gravel Association, 37th Annual Convention, Fairmont Hotel, San Francisco, Calif.

National Ready Mixed Concrete Association, 23rd Annual Convention, Fairmont Hotel, San Francisco, Calif.

Construction Regulations Amended by N.P.A.

THE NATIONAL PRODUCTION AUTHORITY recently revised its regulations governing self-authorization procedures for controlled materials used in residential construction work.

Amendment 1 to N.P.A. Order M-100, which became effective July 1, 1952, liberalizes the self-authorization procedures for controlled materials used in residential construction.

Amendment 1 to Revised CMP Regulation 6, which also became effective July 1, 1952, deals with permissible use of controlled materials for construction in general, including highways.

Farm Market

UNDER THE GOVERNMENT'S financing program, now extended to June 30, 1953, farmers can secure loans up to 80 percent of the cost of a storage structure with interest at 4 percent annually. The Department of Agriculture is concerned with getting sufficient storage for anticipated large crops of grain and corn, which would indicate a large potential market for silos and other structures of concrete.

Percentage Depletion Bill Amended

CONGRESS, on July 5, 1952, passed an amendment (H.R. 8271) to the Revenue Act of 1951, for signature by the President, which would make percentage depletion effective for all taxpayers on January 1, 1951. The law which was passed last year granting percentage depletion to some of the rock products industries discriminated against companies operating on a fiscal year basis. Whereas calendar year companies could obtain percentage depletion beginning on January 1, 1951, fiscal year companies were forced to wait until the end of their fiscal year. The inequity of the Revenue Act was corrected only after tireless effort and cooperation of several national organizations, associations and individual companies of the industries affected.

Silicate Chemistry Research

ESTABLISHMENT OF A Graduate Institute in Silicate Chemistry and Related Sciences was announced recently by the University of Toledo and three Toledo glass companies. The institute will be financed initially by grants totalling $75,000 from the glass companies and $50,000 from the university over a five-year period. The university anticipates that $50,000 in additional funds will be available from other companies which can profit from research in the silicate field. Heading the institute will be Dr. Wilhelm Eitel, who is now engaged by the Office of Naval Research in research in the synthesis of silicate minerals.

Part of the crowd attending the dedication of the plant of Fabrica de Cemento-Commodoro in Argentina

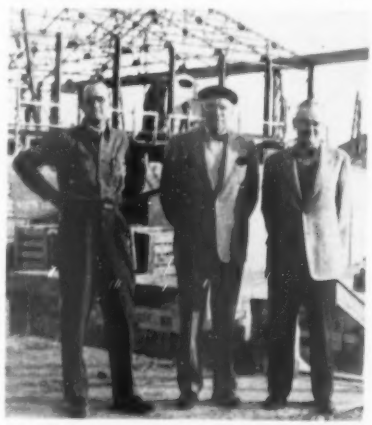
Argentine Cement Plant

THE NEW PLANT of Fabrica de Cemento-Commodoro at Barrio Santa Juana, province of Chubut, Argentina, was dedicated June 24, 1952.

This plant was designed, built and placed into operation for the Petroquimica, E.N., a syndicate of the Argentine government, by Soper Engineers, S.A., under the personal direction of Ellis Clarke Soper. The work at the plant site and training of native personnel were under the supervision of Paul Savage and Gordon Gretter, engineers of the Soper staff.

The plant will produce in excess of 400 tons of portland cement daily and will supply the Patagonian area in the province of Chubut. Chubut is being rapidly developed and cement is urgently needed for rehabilitation and economic development of the area.

The plant was a "package" or "turn key" project and reportedly presented many unusual problems in engineering, procurement, training and administration. From an engineering standpoint, it required many special designs and especially sturdy construction to fit conditions peculiar to the area, such as winds of 150 kilometers per hour, which are quite common in Patagonia.



Attending the dedication of the new Argentine cement plant are, left to right, Gordon Gretter, Ellis C. Soper and Paul Savage, the engineers who designed and built the plant

Soper Engineers recently completed another cement plant of 500 bbl. daily capacity in the Philippine Islands for Philippine Portland Cement Co. at Iloilo which was placed in operation May 1, 1952.

The accompanying pictures were supplied by F. B. Hunter, U.S. representative for Soper Engineers, S.A., who for the past four years has been handling the procurement, export and administrative work in this country for the company.

Panama Cement Production

CEMENTO PANAMA, S.A., Panama's only cement plant, produced 1,800,000 bags of portland cement in 1951, as recently reported in *Mineral Trade Notes*. However, because of handling and operating losses amounting to about 2.2 percent, the plant output available for local consumption and exports was only 1,759,842 bags. Plant capacity is 2,400,000 bags.

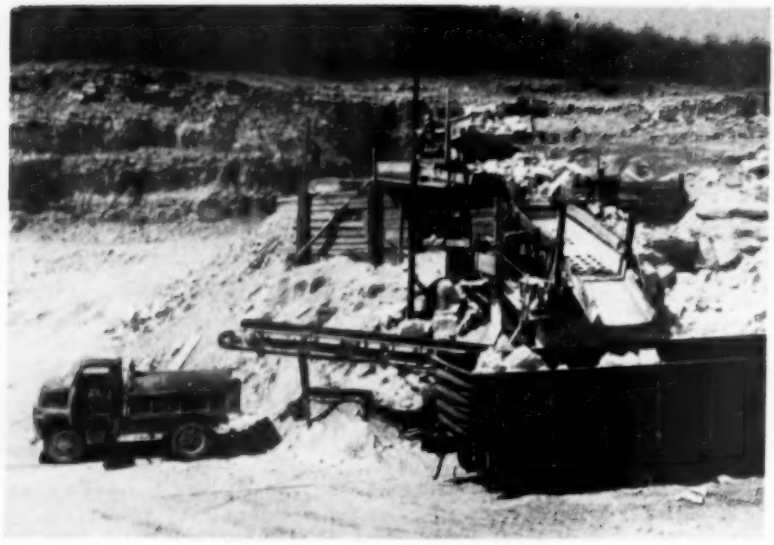
Exports for 1951 totaled 49.2 percent of the saleable production, or 865,842 bags, of which El Salvador was the greatest consumer. Production of cement in 1952 is expected to be increased by about 15 percent, or approximately 2,000,000 bags.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of July and for the first seven months of 1952 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded during July 1952	Sq. yd. awarded during first seven months 1952
Roads	2,657,314	17,861,637
Streets and alleys	3,209,744	15,955,244
Airports	729,434	4,527,278
Totals	6,587,492	38,344,159

HINTS and HELPS



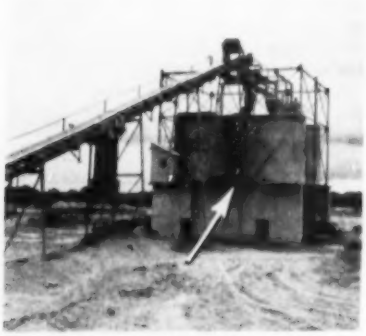
Vibrating screen separates fines from riprap

Riprap Production

THE CONSTRUCTION of earth-fill dams instead of concrete has an adverse effect on some segments of the rock products industries. However, all dams, large or small, and regardless of design, use considerable tonnages of riprap in the 50 to 350 lb. range (one-man stone). Also, quite a number of commercial crushed stone plants have a demand for greater tonnages of riprap. Not so long ago, when a producer received a large order for "one-man stone," the superintendent employed rugged individuals and any stone which they could lift met specifications. The production of riprap has come a long way in the operation shown here. Quarry-run stone is delivered to a truck hopper under which is an apron feeder, and the stone is put over a 4- x 10-ft. heavy-duty Cedarapids scalping screen that has an 8-in. square perforated steel plate screen deck. The riprap falls into open gondola cars for shipment. Undersize falls to a stub conveyor that loads trucks for hauling to the crushing plant, where that material is processed into commercial aggregate.

Loading Installation

EACH OF THE FOUR LOADING BINS shown in the illustration holds about 60 cu. yd. of sand and gravel. The coarser materials going to the bins can be given a final rinse over a stationary screen that is mounted over the bins. Two loading tracks are provided so more than one car can be loaded at a time. The bins are supported by three concrete walls, with the horizontal cross members under the bins consisting of a series of closely spaced 50-lb. steel rails, making a serviceable loading installation.



Arrow points to deck of 50-lb. rails which are part of the base structure for the four loading bins

Disposal of Overburden

A SAND AND GRAVEL PRODUCER who had been using a dredge as the primary excavator contemplated changing over to a dragline operation. He asked for an opinion of the general practice in the United States for disposal of overburden.

General practice is to strip with the dragline and cast the strippings back into the worked-out portions of the pit, where the material is piled in irregular windrows and/or piles. It has not been practice, to our knowledge, to level off or otherwise rehabilitate worked-out gravel deposits where the overburden is above the waterline. In one exception, an operator in the South found that the windrows re-seeded themselves very rapidly and the worked-out area made excellent cattle grazing ground. To make it easier to supervise cattle ranging in this type of ground, the operator contemplated the use of a tractor and dozer to level off a narrow path on the top of the ridges for easier horseback riding. Some shorelines have been leveled off, making an attractive lake, but in these cases overburden was either nonexistent or was deposited back below surface water levels.

Uses for Old Dredge Pipe

USED DREDGE PIPE is too costly to throw away and it has little resale value. One sand and gravel producer uses thin and worn 12-in. dredge pipe for a multiplicity of purposes. One illustration shows how it is used as a bulkhead, or retaining wall,

Retaining wall of sand loading station made of used dredge pipe

Used dredge pipe form piers which support field belt; used steel rail bridges the piers

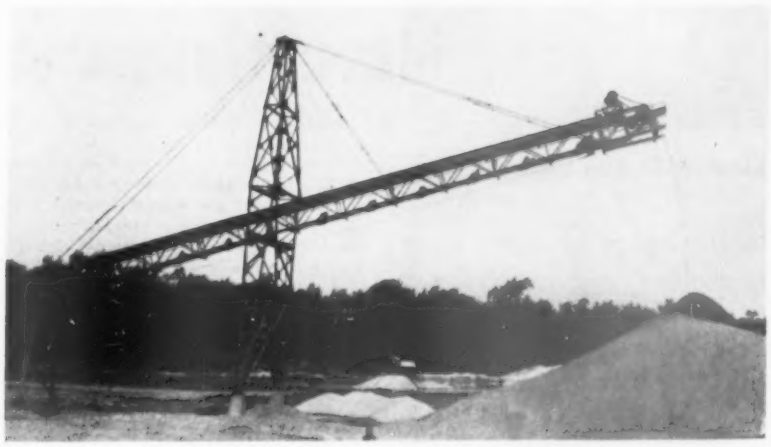
over and in front of the sand loading section of the plant. Another picture shows it being used as piers supporting a field belt. The heavy steel rail cross member is also of used material. It supports the conveyor and will eventually support a walkway. (Note the windguard over the belt.) The

Take-up assembly utilizes used dredge pipe

third use was for the take-up assembly of the field belt conveyor system which was built entirely separate from the main conveyor supports. This stemmed from the fact that the assembly shown is on top of an earth ridge, one side of which (opposite side) was almost vertical. If the fill settled, or a heavy rain caused the bank to cave, the shifting of the take-up assembly would not pull the entire conveyor system with it. All vertical members are used 12-in. pipe and all horizontal pieces are used steel rails from earlier operations.

Reclaiming System

THE ILLUSTRATION below (left) shows the details of a bucket elevator boot that can be assembled by almost any welder. It is part of a novel reclaiming system. The overhead gallery shown in the illustration below (right)



A sturdy and well-built surge pile conveyor system

carries two separate, flat-running conveyor belts. The longer one, with a tripper, builds up the stockpiles. The hopper and then the slightly inclined belt conveyor receive reclaimed stone via a clamshell, front-end loader, or shovel and truck, and the bucket delivers to the shorter belt in the upper steel conveyor gallery. Thus one truss supports two conveyors. The operation is in the 500 to 800 t.p.d. range.

Surge Pile Conveyor

A BELT CONVEYOR SYSTEM used to build up a surge pile ahead of the main plant recently went into operation at a new sand and gravel plant in the South. It is supported by a single steel mast and the conveyor has a walkway to its outboard end. Of particular interest is the rocker arrangement at the base of the mast which allows for movements due to contraction and expansion of the assembly. This conveyor carries a 24-in. belt.

Several belt conveyor systems, where the belt passed over a river or valley and was supported by steel masts somewhat similar to the one shown here, have been observed and these masts had a similar rocker-footing.

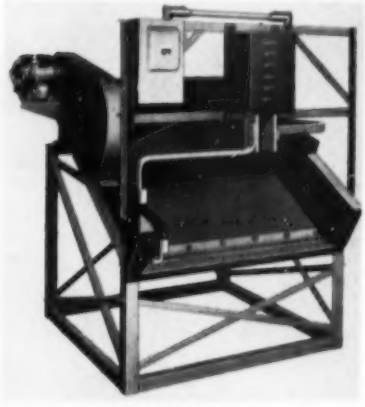
Rocker-type base of mast permits expansion and contraction of the conveyor assembly

Left: Assembly of bucket elevator boot. Right: Gallery has two separate conveyors, one for building stockpile and the other for reclaiming

NEW Machinery

Electric Screen Heater

THE DEISTER CONCENTRATOR CO., 901-935 Glasgow Ave., Fort Wayne, Ind., has perfected an electric jacket heating system, called the FlexElex, for use on the Leahy vibrating screen. An average size unit consists of a 15 kv.-a. dry type, single-phase transformer of 220-440 volt primary and low voltage secondary; all necessary switches and controls for close adjustment of current and heat used; full complement of high capacity flexible cables with attachment lugs for connecting the transformer to the heavy copper bus bars of the special screen jacket assembly; complete insulation of the wire screen jacket from all other metal parts of the screen; and cable and transformer supporting brackets.



Electric jacket heating system

Tractor-Drawn Scraper

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif., has announced a 22-cu. yd. tractor-drawn scraper, the TC-190. The new model has a capacity of 19 cu. yd. struck and 22 cu. yd. heaped. Standard equipment calls for 21:00 x 24 tires front and 24:00 x 25 rear. Standard new type side cutters of manganese alloy steel are bolted on to protect bowl side sheets. Positive fast dumping with less tractive effort is said to be achieved by a rolling motion applied by the ejector, pivoted at the blade base. Among other features claimed are simple reeving and long cable life, maneuverability aided by low center of gravity, and high ground and yoke clearance.

Scraper with 22-cu. yd. heaped capacity

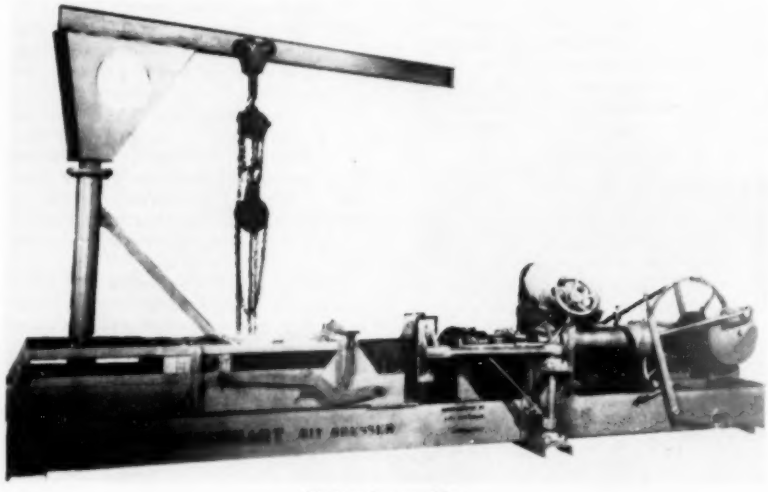
Medium and Heavy-Duty Trucks

GMC TRUCK & COACH DIV., General Motors Corp., 660 S. Boulevard, East, Pontiac 11, Mich., has introduced four new six-wheel GMC diesel medium and heavy-duty truck models. Model DW450-37 has ratings of 26,000 lb. g.v.w. and 38,000 lb. g.c.w. Standard transmission is a five-speed overdrive, while front and rear axles are 6000 and 15,000 lb. capacity, respectively. Four wheelbases are offered, making available c.a. dimensions of 72, 84, 102 and 120 in. The engine is a 3-cyl. diesel developing 110 hp. and 282 ft.-lb. torque.

Model DW620-47 is a lightweight, tandem axle diesel with a 4-cyl., 50-hp. engine, and ratings of 33,000 lb. g.v.w. and 55,000 g.c.w. Air brakes and cast spoke wheels are standard. Model DW630-47 has ratings of 42,000 and 70,000 lb., respectively. Front axle is 11,000 lb. capacity, while a worm drive tandem is standard at the rear.

Model D470-37 has ratings of 21,000 lb. g.v.w. and 45,000 lb. g.c.w., respectively. Chassis weight is 1400 lb. lighter than any diesel model previously offered in this capacity range. It is powered by the 3-cyl. diesel.

Lightweight, tandem-axle diesel truck



Bit dressing machine

Bit Dresser

A. W. MITCHHART, 303 W. Market St., Tiffin, Ohio, announces a bit dressing machine which will dress regular bits, star bits, reamers and under diggers up to 12 in. It dresses all bits ready for tempering without turning or touching with the hands.

The operator places the bit in the machine, then dresses face of the bit with a forging die. When the bit is spread to the proper width, the operator stops the forging hammer, grabs the lever that operates the side hammers, which carry the side dies, and with a few strokes of the side hammers, dresses both sides or edges of the bit. No bit gauge is needed. Automatic stops on the dies hold them to the exact size wanted. A water course attachment is also available for dressing out water course and sides of a bit. The operator can strike any force blow desired from a light tap to a blow of 1800 lb. without changing the speed of the machine.

All shafting is carried on self-aligning ball bearings; power is transmitted from the power unit to the machine by V-belts. The portable machine can use gasoline, electric or any other power units.

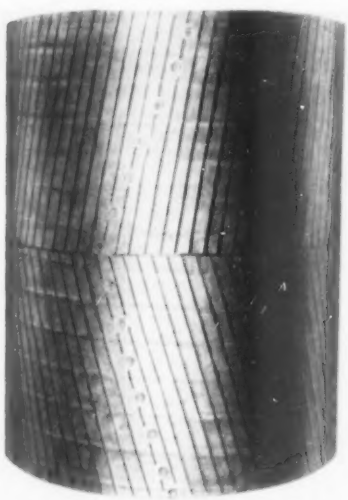
Crane with fluid torque drive

Torque Converter for Crane

UNIT CRANE AND SHOVEL CORP., 6509 W. Burnham St., Milwaukee 14, Wis., has announced the application of fluid torque drive as a standard installation on its ½-cu. yd. crawler and mobile machines. The unit is connected to a worm driven power take-off by means of a chain coupling which eliminates the engine clutch and its lever system. The machines use a 6-cyl. industrial gasoline engine and a Chrysler torque converter.

Conveyor Pulley

THE AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Penn., has added a new spiral lagging called Griplex to its line of solid welded-steel belt conveyor pulleys.



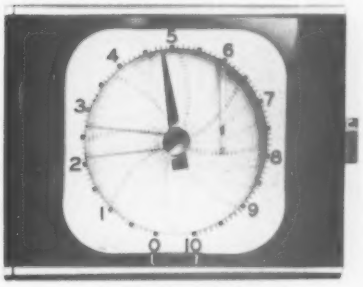
Belt conveyor pulley with lagging

The lagging is made of duck with thick rubber facing, and is applied in one continuous piece under tension. It is securely anchored to the conveyor pulleys by an adhesive and a bolting method and is fully countersunk. The company has also introduced a Type "HD" heavy-duty conveyor pulley with tapered hubs. The pulley is for large conveyor installations where both horsepower and tonnage are high. Made of split-tapered construction, the hubs grip the shaft firmly, making keys unnecessary, the manufacturer states. Eight alloy-steel cap screws aid positioning. The pulleys are totally enclosed, dirt- and splash-proof and are manufactured in sizes up to 6 in. dia. x 63 in. face, for shafts up to 10 in.

Round-Chart Recorder

THE BRISTOL CO., Waterbury, Conn., announces the addition of round-chart recorders and automatic controllers to its line of electronic Dynamaster potentiometers and bridge instruments. The round-chart recorder can be used to measure any variable that can be translated into an electrical quantity, such as d-c current, d-c voltage, capacitance, or resistance. Thermocouples, radiation detecting units, resistance thermometer bulbs, pH amplifiers, tachometers, magnetos, strain gauges, smoke density detectors, thermal converters for power measurements, beta ray gauges, and many other sensing elements can be used with it.

The measured variable is simultaneously recorded on a 12-in. dia. chart and indicated on a large circular scale which is legible at a distance. Models are offered for full-scale pen travel in 7 sec., 3 sec., 1½ sec., or ⅔ sec. and with a wide variety of ranges. The recording mechanism is on the front of a hinged aluminum alloy panel, which can be swung out to gain access to the electronic components.



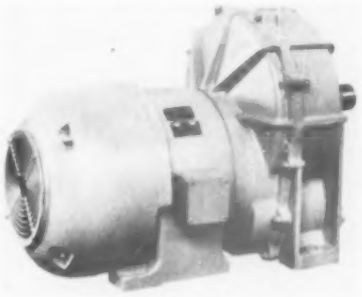
Round-chart recorder

Dual Purpose Preservative Oil

THE TEXAS CO., 135 E. 42nd St., New York, N.Y., has developed a dual-purpose lubricant and preservative oil for internal combustion engines in storage or intermittent service. The product is called Texas Preservative Oil 10 and 30 and when functioning as a lubricant it need not be changed until the engine has reached the normal draining-and-refill point. The lubricant is compatible with qualified heavy-duty motor oils.

Geared Electric Drive

STERLING ELECTRIC MOTORS, INC., 5401 Anaheim-Telegraph Road, Los Angeles 22, Calif., announces the addition of larger totally enclosed fan-cooled geared motors to its line of Slo-Speed electric power drives. These units are double reduction and available with Class I, II and III gears in frame size 364/365, and A.G.M.A. speed of 155 r.p.m. and slower in ratings from 5 to 25 hp.



Enclosed fan-cooled motor

In this drive, bearings are mounted in the outer walls of the gear case and gears are mounted between these widely spaced bearings, permitting use of offset shafts and providing permanent bearings and gear alignment in uniform distribution of load.

Side-dump truck bodies which dump to either right or left

Side-Dump Truck Bodies

THE GALION ALLSTEEL BODY CO., Galion, Ohio, has announced a new line of side-dump truck bodies. Known as "Roll-Over," the bodies are entirely mechanical in operation, dump to either right or left side, and are available in a wide variety of sizes and capacities. Bodies are of a 10-gauge steel and can be mounted on all standard trailers. The self-contained subframe consists of three heavy box-type outrigger cross members. Front and rear outriggers are built with a series of gear-like teeth which roll inside the formed channel tracks welded to the body.

Main locking mechanism is a down-pull, spring-loaded type plunger pin which engages in a socket built into an angle welded to the head of the body. The lock pin is actuated by a lever mounted to an A-type frame welded to the front of the subframe. The lever can be operated from either side of the body.

In dumping operation, the driver disengages the spring lock chain on the opposite side of the body to which load is to discharge, then releases the plunger lock lever. Bodies can be righted manually or by a slight snaking movement of the truck.

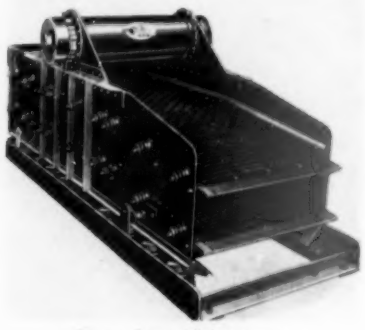
Multi-Stage Centrifugal Pump

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y., has redesigned its line of horizontal, multi-stage centrifugal pumps for medium pressure applications. These pumps, called the Class CNTA, are intended for mine dewatering, boiler-feed, marine, refinery and general industrial services. Built in 1½-, 2-, 2½- and 3-in. sizes, units are available with 4, 6 or 8 stages.

The pumps feature a horizontally-split, smooth-bore cylindrical casing which contains the unit-type rotor assembly, composed of the shaft, impellers and channel rings, which contain the multiple-volute fluid passages. The interstage sealing arrangement utilizes an alloy cast iron or stainless steel piston ring around the outer diameter of each individual channel ring. These hydraulic-type, step-seal rings have a metal-to-metal fit with the casing.

Scalping Screen

DEISTER MACHINE CO., 1933 E. Wayne St., Fort Wayne, Ind., has developed the UHS Deister heavy-duty scalping screen with Unitized head motion. Built as a unit, the head motion features two-bearing construction, and runs in a bath of oil. The screen features opposed elliptical-throw action, which controls the movement of material on the screen for the greatest speed and efficiency of sizing. The elliptical throw begins at the input end, where the material is thrown to the discharge end to increase stratification—or "thinning"—of the load directly under the input chute. Near the center of the screen, the elliptical throw becomes a circular throw, bouncing material up and down for stratification efficiency. Below the center, the elliptical throw reverses to a holding action, thus retaining the thinned bed of coarser material on the screen long enough to permit maximum grading.



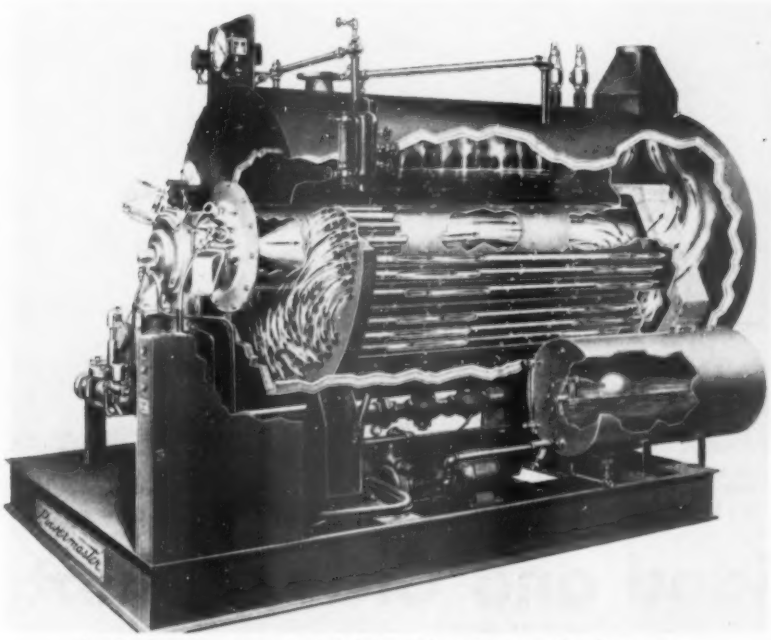
Heavy-duty scalping screen

Portable, one-unit dryer-mixer combination

Dryer-Mixer for Repaving

BARBER-GREENE CO., Aurora, Ill., has developed a portable, one-unit dryer-mixer combination for use in patching breaks and failures in both asphalt and concrete roads. Designed expressly for towing at normal truck speeds, the "Mixall" is mounted on a sturdy two-wheel pneumatic-tired chassis, with an adjustable towing hitch to accommodate trucks of varying size. The upper edge of the unit's skip is only 14 in. above the ground level. The skip discharges the aggregate into a rotary drying drum. Flights around the drum's under circumference lift the aggregate particles and drop them, repeatedly, through a blast of hot gas and flame provided by an oil burner.

The force of this heated blast drives off the moisture removed from the aggregate, exhausting it through twin stacks. The aggregate is then chuted into a twin-shaft pugmill. Capacity depends upon the type of mix being produced and the amount of moisture to be removed from the aggregate. The machine can produce 5 t.p.h. of hot mix or 10 t.p.h. of cold mix. The unit is also able to produce stabilized base materials, able to mix portland cement concrete, including low slump mixes and the dryer can be used in thawing (as well as drying) and heating frozen aggregate, and in thawing abrasives for winter-skid control.



Details of the three-pass automatic boiler with condensate and makeup system

Automatic Steam Generator Burns Oil or Gas

ORR & SEMBOWER, INC., Morgantown Road, Reading, Penn., has built the Powermaster automatic steam generator with the horizontal fire-tube boiler as the basic component. It is constructed with a three-pass internal furnace. Voriflow burners for light oil, heavy oil and commercial gas fuels as well as dual combination burners modulate between 30 percent and 100 percent of fuel load rating.

Combustion gases travel through the central combustion tube, reversing their flow back through the lower bank of tubes, then again toward the rear branching through two lateral banks of tubes. Front and rear covers are removable for inspection. A cylindrical combustion chamber for complete combustion is within the furnace, while the boiler feed and condensate handling system is optional.

The boilers are built in 16 sizes from 15 hp. to 500 hp. for pressures up to 250 p.s.i. The high heat transfer is in the order of 4.5 to 5.0 sq. ft. per boiler horsepower.

Front-End Loader

TRANSMISSION & GEAR CO., 10421 Haggerty, Dearborn, Mich., has announced a ½- to ⅝-cu. yd. front-end loader which uses a patented loading method of rocking, scooping and lifting. Other features of the TL-50 Transo Load Master include a full dumping height of 72 in., overall wheelbase of 44 in., and elimination of an engine clutch. A heavy-duty master clutch is located in the front end of the integral transmission and driving axle unit. The loader uses a Ford engine coupled to a Transo transmission by two universal joints.

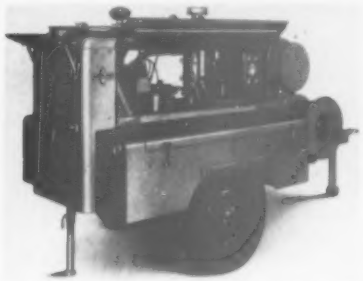
Front-end loader rocks bucket into load

Oversize Tire

FIRESTONE TIRE & RUBBER CO., Akron, Ohio, has built a special "48 x 68" tubeless tire, designed by R. G. LeTourneau for experimental use on a "swamp buggy" now undergoing development by that company. The tire is 10 ft. high x 4 ft. wide and is designed to operate at an air pressure of from 10 to 15 lb. (depending upon deflection). To accommodate this tire, a low flange wedge-type wheel was developed.

Portable Compressors

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y., has rounded out its line of Gyro-Flo portable compressors with three sizes in addition to its 600-c.f.m. model. The two-stage, oil-cooled, rotary sliding-vane compressor design is included in the new

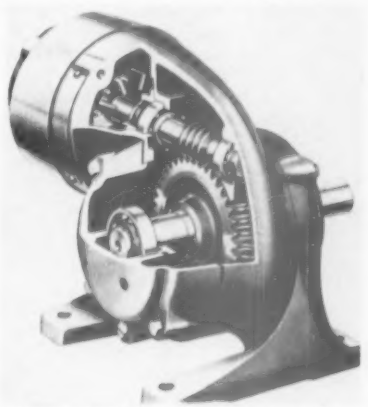


Portable compressor with 105 c.f.m. capacity

315, 210, and 105 models as well as the rest of the line. There are no valves, pistons, rings, rods or clutch. Air is discharged at less than 200 deg. F. under normal operating conditions. Throughout the entire capacity range the air pressure stays between 100 and 110 p.s.i. The 600-c.f.m. model weighs 9500 lb. and is powered by a General Motors diesel engine. The 315- and 210-c.f.m. sizes offer a choice of either GM diesel or Continental gasoline engines.

Right-Angle Worm-Gear Motors

U.S. ELECTRICAL MOTORS INC., P.O. Box 2058, Los Angeles 54, Calif., is producing the Type GW Syncrogear,



Motor with right-angle worm gear drive

a low speed right-angle worm-gear motor which incorporates a cantilever design to protect gear alignment. Mounting stresses are absorped by a single-unit pyramidal base with "spread eagle" feet. It embodies splash lubrication, a hardened and ground worm, leakproof oil seal and asbestos-protected windings. These motors are built in speed ranges from 20-155 r.p.m., gear ratios up to 58:1, and horsepower ratings from ¼ to 3.

Main plant. Reclaiming belt (left) delivers material from the surge pile to the blade mill (center). At the right end of the mill is a two-deck, wet scalping screen. Sand from the lower deck of the scalper is flumed to a twin sand screw (right foreground) which unloads to a belt serving a sand stacker. Car loading installation is in background

Two-Stage Sand and Gravel Plant

Portable field plant does preliminary processing of material which is then sent to permanent plant at W. R. Bonsal Co., Cash, S.C., operation. Wash mill eliminates clay

By WALTER B. LENHART

W. R. Bonsal Co. Inc., Lilesville and Hamlet, N.C., is well known to the sand and gravel industry as one of the older producers in the Southeastern area. The deposits around Lilesville require considerable stripping. Clay inclusions are severe, and deposits are relatively shallow.

In an effort to increase the supply of the high grade material, which is rapidly being depleted, the company several years ago inaugurated a very extensive prospecting program in an effort to locate gravel deposits of economic grade which could be used as a suitable building material. This work was in the section of country south of Cheraw, S.C., an important town just over the North and South Carolina border. At the 1952 meeting of the National Sand and Gravel Association in Chicago, F. J. Cloud, vice-president of W. R. Bonsal Co. described some of the equipment used in drilling this area. As a result of the intense prospecting program, suitable deposits were located about 10 miles south of Cheraw at Cash, S.C. Late in 1951 a 2-mile long railroad spur was built by the company and near the end of that spur a new sand and gravel processing plant entered preliminary construction stages.

It went into operation April 1, 1952. The plant was designed cooperatively by the engineering staff of W. R. Bonsal Co. and E. Lee Heidenreich, consulting engineer, Newburgh, N.Y. It was constructed by the company under the supervision of D. B. Gregg, a mining engineer with wide experience. Mr. Gregg remains at Cash as assistant manager. Jeff Cloud, son of F. J. Cloud, was in direct charge of the prospecting work and is now manager. The new installation is known as the Anderson plant. It is on the Atlantic Coast Line railroad.

Loading facilities at the main plant. Sand loading set-up is in foreground, gravel loading in background; each installation has a separate ground storage and reclaiming tunnel

Because of the nature of the deposits in the area the operation is divided into two sections. Section No. 1 is a portable set-up that was designed to give the material a preliminary wash and to return to worked out portions of the pit any unwanted sizes. Smith Engineering Works designed and built most of the portable plant.

Sand for concrete and other construction work is plentiful in South Carolina and because of the competitive picture on the freight rate structure to the larger populated areas, the recovery of sand is not important and is not stressed here. However, the deposit contains an excess of that material. The deposit being worked at the time of inspection required from none to 12 ft. of stripping. The gravel ranges from 27 to 31 ft. in thickness. About 50 percent of the gravel will pass a ½-in. screen. The gravel is not large compared to some pits but there is sufficient large gravel to justify a crusher in the permanent plant set-up. This is a 3-ft. Symons cone crusher.

It was indicated that later the method might either be (1) to strip, casting back into worked out portions of the pit, or (2) to excavate the gravel and store it in windrows on the unstripped rim of the pit where the material will drain. Aeration and aging in the pile will help in the easier elimination of clay portions at the blade mill-scrubber.

Draglines using Hendrix buckets can load to the hopper serving the portable plant, or if pit-run is desired the draglines can load direct to a fleet of three Model 1-UD 6½-cu. yd. (struck measure) rear-dump Euclid trucks for delivery to the permanent plant for further processing. In the event the gravel is cast into the hopper of the portable field plant, the trucks haul the semi-processed material to the permanent plant at the railhead. The company has available a No. 604 Lima with a 1¾-cu. yd. bucket and a No. 1201 Lima with a 3½-cu. yd. bucket. Casting strippings back into worked out portions of the pit parallels the practice in scores of gravel operations throughout the United States where draglines are the primary movers of material; there is no economic justification for further handling of the strippings. Besides the two draglines, there is available an Adams haulage scraper, Model 60, drawn by an International tractor that has an Adams power control unit. This machine can be used for stripping and for miscellaneous uses about the plants.

The permanent plant is of steel and concrete construction throughout. The plant features the use of a large surge pile ahead of the preliminary scrubber unit. The scrubber used is a 7- x 14-ft. Allis-Chalmers blade mill. The lifter blades in this unit are arranged in a spiral. The blade

Above: Portable field set-up gives the material a preliminary wash and returns unwanted sizes to the pit; sand and gravel is then hauled to the main plant by trucks

Right: Portable plant used in the field installation

Above: One of the draglines loading pit-run gravel to a 6½-cu. yd. truck

Right: Final gravel loading installation at main plant. It is given a final rinse over the stationary screen; trucks load from the steel hopper at left

Left: Material from the field plant is hauled to this belt conveyor which builds up a surge pile ahead of the blade mill scrubber. Center: The only crusher in the main plant is a cone unit since gravel is small. Right: A three-deck sizing screen is used over four-way final gravel storage system

mill is mounted on a steel structure and is driven through a Falk speed reduction unit.

Allis-Chalmers Low-Head screens are used as a scalper following the scrubbing and for the final gravel sizing. One size of sand is recovered from an Eagle twin screw classifier. The twin screws operate in a 72-in. wide tank. The spirals are 18 ft. long and each is 30 in. in diameter. Belt conveyors carry the sand to a storage pile, under which is a tunnel and reclaiming belt for car and truck loading purposes.

The portable plant is made up of a series of sections, each mounted on rubber tires. These sections when assembled make up the field plant. The core of the plant (feeders, screen, sand screw) are Telsmith. Field bins are of steel, made by Butler. Both Link-Belt and Continental Gin idlers are used in three portable field belt conveyors. The dragline unloads to the steel hopper under which is a reciprocating feeder, and the material is delivered to a belt conveyor serving a two-deck, 5- x 12-ft. Telsmith Vibro-King vibrating screen under which is the sand screw. The gravel, plus a desired amount of sand, is transported to the Butler bin where the Euclid trucks haul the material to Plant No. 2, a distance at time of inspection of about one-half mile. Unwanted material is returned to the pit. The water table in the area is about 10 ft. below surface and water as needed is pumped to the portable plant from the pit. Goodrich belts are used on the portable belt conveyors. The conveyors themselves were supplied by Barber-Greene. The main section of the portable plant is mounted on eight Goodyear tires.

The main washing and screening plant uses belt conveyors for intra-plant transportation. All the belts are 24 in. wide except the two belts (to and from) the Symons cone crusher which are 18 in., and the sand stacker belt which is 20 in. These belts were supplied by the Cincinnati Rubber Co.

Upon arriving at the final permanent plant, the trucks dump to a hopper serving conveyor belt No. 1 which builds a large surge pile. A reclaiming belt operating in a tunnel under the surge pile delivers to the blade mill, and following the blade mill is a two-deck, wet 4- x 12-ft. Allis-Chalmers Low-Head scalper. Oversize from the top deck is sent to the Symons cone and the crushed material returned to the belt conveyor serving the blade mill. Sand from the lower deck is flumed to the Eagle twin sand screw which in turn discharges to a belt conveyor serving a sand stacker belt. Intermediate sizes of gravel are transported to the concrete radial tower, on top of which is a three-deck, 4- x 12-ft. Allis-Chalmers Low-Head screen operating dry. The four sizes of gravel produced fall to the storage area below.

The concrete section of the radial tower is 27 ft. high at its highest point, and each of the four wings is 35 ft. long. The storage section in plan is in the form of a cross with each quadrant of equal size. Gravel from the four piles is reclaimed to a belt conveyor operating in a concrete tunnel below the pile. Prior to falling into the cars the gravel is given a final rinse over a stationary screen at the point of loading. The gravel is loaded from one loading section and the sand from a separate system. At each of the car-loading units a steel bin has been provided so that trucks can load simultaneously. A Syntron electrical vibrating feeder is under the finished sand pile. All other reclaiming gates were company made. The plant has a capacity of 200 cu. yd. per hr.

(Continued on page 108)

Left: Twin-screw unit for recovery of sand; feed end is at right, discharge at left. Right: Interior of the centrally located electrical control room

Crushing Practice and Theory

Part X. Characteristics and performance of hammermills

By BROWNELL McGREW*

THE HAMMERMILL IS the best known and by far the most widely used crushing device employing the impact principle of breaking stone. Thus far we have described machines which do a portion of their work by impact, but the only machine described in which this action plays an important role was the sledging roll type—particularly the Edison roll crusher—and in these machines impact is supplemented to a substantial degree by a positive and powerful sledging action by teeth which are rigidly attached to massive rolls. In the hammermill, impact is the predominating action although its scope varies in different designs of this machine, as will be seen.

General Description

The hammermill, fundamentally, is a simple mechanism. The "orthodox" machine comprises a box-like frame, or housing, a centrally disposed, horizontal-shaft rotating element (rotor) on which the hammers are mounted, and usually a set of circumferentially arranged grates in the lower part of the housing. The rotor consists of a shaft carried in bearings at either side of the housing, and the hammer-center of multi-flange drum or spool shape. The flanges of this drum-like assembly are drilled near their outer edges for hinge pins to which the inner ends of the hammers or hammer arms are attached. The hammers themselves are made in a variety of styles and shapes. Sometimes the hammer arm and head are cast, or forged, integrally; in other designs—as in the A-C Pulverator—the arms and hammer head are separate pieces.

The grates usually consist of a transversely arranged series of tapered, wear-resisting steel bars, which form a cage of circular cross section across the lower part of the housing just below the hammer path. The spacing of these steel bars varies quite widely, depending upon the size of product and upon the characteristics of the material to be crushed. The spacing may be anything from ⅛ in. or slightly less, up to several inches, and in some machines may be dispensed with entirely for coarse products and closed-circuit operation.

Hammermills may be connected directly to the driving motor, or driven by a flat belt or V-belts. The two latter methods have one material advantage over the direct drive—they permit speed adjustments to achieve optimum performance for each particular set of conditions. Belts also afford a substantial cushioning effect between mill and motor when tramp iron or broken hammers throw heavy shock loads upon the driving apparatus.

In the hammermill we are dealing with velocities much greater than any we have considered so far. Tip velocities of the hammers start in about where the highest speed roll crusher operates (the 3500 f.p.m. speed of the Edison roll crusher), and range from there up to 10,000 or 12,000 f.p.m. These high velocities are necessary because the hammermill does practically all of its crushing through transference of the kinetic energy in the free-swinging hammers to the material at the instant of impact, and this energy must be delivered without deflecting the hammers very far from their no-load radial position if the machine is to operate smoothly. The crushing blows may be delivered against free material (pure impact breaking) or against material supported on a breaker plate, in which case the action is a high velocity sledging. In either case the mass velocity force stored in the hammer does the work; the function of the motive power is to maintain, and restore, this energy—in which it is assisted by the kinetic energy in the rotor, supplemented in many machines by heavy flywheels mounted on one or both ends of the rotor shaft.

Most hammermills receive their feed on the down-running side of the rotor. In machines of this type the preliminary breaking is done while the material is supported against breaker plates whose inner surface is flush with the grate circle at the lower end. In the grate zone the reduction is continued by interaction between hammers and grates, the process being a combination of "nut-cracking" action and impact of hammer-to-material and material-to-grate bars. In this type of mill a considerable portion of the total work is done in this zone; the clearance between hammer tips and grate surface is close; and, usually, the grates or the hammers, or both, are adjustable so that this close clearance may be maintained. One particular make of mill, which does its work in the manner described, receives its feed directly over the top of the rotor, and is arranged for reversible operation—having two sets of grates symmetrically disposed on either side of the rotor.

In the Pulverator, a cross-sectional view of which is shown in Fig. 1, the process is, in one important respect, a reversal of that just described. The material enters the machine on the up-running side of the rotor, where it is struck by the hammers as they start their sweep across the upper part of the housing. The top of the crushing chamber is lined with a series of breaker plates whose impact faces are involute with respect to the hammer circle, so that material hurled by the hammers impinges squarely against these surfaces regardless of the striking point. The action in this impact zone is a succession of violent blows, first from hammer-to-material and then from material-to-breaker plate, and so on through the several stages of the involute series. As contrasted to the type previously described, most of the work in this crusher is done in the breaker-plate zone; the grates function chiefly as a scalping grizzly, and the clearance between hammers and grates is relatively large. A certain amount of impact breaking does take place between hammers and grates, but this is secondary to the work done against the involute plates. On friable material this machine will deliver a medium fine (¼ in. to ⅜ in.) product with some, or even all, of the grates removed.

Capacity of Hammermills

The capacity of any given size and type of hammermill depends upon several factors. The character of the material influences the performance of this machine to a greater degree than it does that of any of the crushers previously discussed. It is only natural that this should be the case;

*Allis-Chalmers Manufacturing Co., Los Angeles, Calif., district office.

Table I. Hammermill capacities

Size feed throat opening without feeder, in.	Ring size feed, in.	Without grate bars	Capacity per hr. in tons (2000 lb.) Crushed material weighing 100 lb./cu. ft. Opening between grate bars, in.							Pulley, max. r.p.m.	Electric motor, hp.	Approx. wt. without feeder, lb.
			1¼	1	½	⅜	¼	3/16	⅛			
6¼ x 9	3	12	—	—	10	8	5	3½	2½	1800	15 to 20	1400
12 x 15	3	48	39	36	29	23	17	13	9	1500	50 to 60	3800
15 x 25	6	80	70	65	47	40	31	25	18	900	100 to 125	11,200
15 x 37	6	120	105	97	71	60	47	37	27	900	150 to 200	14,100
15 x 49	6	160	140	130	95	80	63	50	36	900	200 to 250	17,000

all of the energy consumed in the crushing chamber is delivered by free-swinging hammers, and it is to be expected that there would be a considerable difference in the effect of these impact blows upon materials of varying physical structure. Higher speeds will of course produce better shattering effect to take care of hard rock, but there are definite limits, both from mechanical and operational standpoints, to the speed of any particular mill.

Speed, or velocity, while it is the very life of the hammermill, may also function to limit the amount of feed that the mill will take. Thus, in any given machine, the number of rows of hammers used will affect capacity. Or, to state it a little more clearly, for any combination of speed, feed size, and number of rows of hammers there is a definite limit to the amount of material that the mill will receive. This is understandable when it is considered, for example, that in a machine running 1500 r.p.m., with four rows of hammers, the receiving opening is swept by a row of hammers 100 times each second, and there is obviously a limit to the amount of material that can enter the space between two successive hammer rows in this short period of time. We find that for some combinations of feed size and product size, more production can be obtained with only two rows of hammers, rather than three, or more. Radial velocity of the material entering the mill will naturally have a direct bearing upon the amount that will drop in between the rows of hammers. Thus, in a well designed mill the feed spout is always so arranged that the material falls, rather than flows, into the crushing zone.

It is hardly necessary to state that the size of product directly affects the capacity of a hammermill, just as it does any type of crusher. The finer the product the more work the machine must do; furthermore, the grate bars, when any are used, must be spaced closer, which means that the open area of the grate section is reduced. When the grate bars are spaced widely, or dispensed with, and the sizing is done over a closed-circuited screen, product size has the same direct influence upon capacity because, the finer the screen openings, the more return load and, hence, the less original feed that can be handled by the mill.

Size of feed affects capacity, but not always in the inverse proportion which might, at first thought appear to be logical. For example, suppose we were operating a medium-size hammermill on limestone, turning out a 10-mesh product. We know that this machine will handle more tonnage if we feed it with, say, 3-in. maximum size rock, as compared with a feed of 10-in. or 12-in. maximum size—which accords with the "logical" expectation. However, if we further reduce the feed size to, say ½-in. maximum, we find that our capacity will increase very little if at all; in fact it may actually *decrease*. This apparent anomaly is explained by the fact that the effect of impact upon a free body of material varies directly with the mass of the body; consequently the energy absorption, and hence the shattering effect, is much greater on the 3-in. piece than it is on the ½-in. particle.

Because all these variables that we have noted have an influence upon the capacity of the hammermill, it is impossible to present a comprehensive tabulation of capacity ratings which can be relied upon for any and all materials. We can however do so for any one material, as we did for the Fairmount crusher. It is convenient and logical that this should be a medium limestone in this case also, because hammermills are applied extensively to crushing, and pulverizing, that kind of rock.

Table I gives approximate capacity ratings of the various sizes of Pulverators, on medium limestone, and for various grate bar spacings. Unless the prospective hammermill user has operational data on which to predicate his selection of a new machine for some specific service, the safest procedure is to have his material tested, either in the field or in the laboratory, in a mill of the type he proposes to install.

Product Characteristics

Two broad general statements may be made about the character of product delivered by the hammermill:

(1) The percentage of fines, in a product of similar "top size," will usually be substantially higher, as compared to products of pressure-type crushers.

(2) On almost all materials for which the hammermill is economically suited, the product will be of a cubical nature—with a minimum of flats and splinters.

The shattering effect of the blows delivered by hammers traveling at velocities as high as 200 f.p.s. is conducive to both of these results. It is natural to expect that gradation of the hammermill product would vary somewhat for materials of differing friability, and results verify this expectation. Furthermore, speed has a definite influence upon product gradation; high speeds increase fines, and vice versa. The effect of impact at extremely high speed is, on friable material, almost explosive, the action being more aptly designated as "pulverizing," rather than crushing. Lower impact velocities have a more moderate breaking effect, and if the material is able to clear the crushing chamber before it is struck too many times, the low speed hammermill will turn out a fairly uniformly graded product on material of average friability.

The design of the crushing chamber will also affect product gradation. In general, those machines which perform most of their work by straight impact action will turn out a more uniformly graded product than mills which depend upon interaction between hammers and grates for most of their reduction. This is only natural in view of the fact that attritional grinding is minimized in the former type of mill.

Operational Characteristics

The method of operation has a considerable effect upon the nature of the product. When minimum fines are a requirement, the hammermill should always be operated in closed circuit with a screen, or screens; the circulating load should be fairly high; speed should be as low as is consistent with physical structure of the material; and grates should be widely spaced or, in some cases, dispensed with entirely.

Although the hammermill usually produces a relatively high percentage of fine material, it does not usually make an inordinately high proportion of what are commonly designated as "extreme-fines" unless the mill is adjusted and operated with that end in view. For example, if we are turning out a ¾-in. (top size) product in one of these machines we will usually find the proportion of particles in the range between ¼ in. and about 30 or 40 mesh to be high, as compared to the product of pressure-type crushers; but unless the material is very friable and the natural grain size very fine the percentage of minus 100- and 200-mesh particles will usually compare quite closely. Here again we have the fact that the impact effect falls off directly with the particle mass, to explain an apparent inconsistency.

It is easy to understand why the hammermill should turn out a cubical product. The impact action is ideally adapted for breaking flat or elongated spalls. If the material contains numerous parallel cleavage planes the ini-

tial blows delivered by the hammers may knock off flat spalls; but the chances are very much against such spalls getting out of the machine before they are struck several times and broken into particles of more cubical proportions. This is especially true of machines which have a long impact zone ahead of the grate section, as no particle can possibly be discharged until it has passed through this impact section, where it will almost certainly be struck several blows.

Ratio of Reduction

Hammermills are capable of accomplishing reductions very much greater than any other type of crushing equipment. It is possible, though not always economical, to make reductions as high as 20:1 in open circuit, and to double this performance in closed circuit. As in any other type of crusher, low reduction ratios are indicated where a low percentage of fines is desirable.

Applications

Time was when all hammermills came under the generic title of "pulverizer," which was quite appropriate as it aptly described the kind of work to which they were, in those days, almost exclusively applied. This duty consisted largely of such work as pulverizing limestone for various purposes: agricultural flour, glass sand, tube mill feed, and so forth. This was work for which the hammermill was and is preëminently well suited, and large numbers of them are used today for such service. The field has however in recent years been greatly expanded. The following list, while not comprehensive, includes some of the more important present-day applications:

(1) Agricultural limestone.
(2) Grits.
(3) Glass sand, or flour.
(4) Raw materials for cement manufacture.
(5) Coal and coke crushing.
(6) Preparation of tube mill feed on several nonabrasive materials.
(7) Gypsum crushing and pulverizing.
(8) Shale crushing.
(9) Grinding hay and grains for chopped feeds.
(10) Manufactured sand for concrete aggregates.
(11) Commercial crushed stone production.
(12) Dry crushing of ores for dry or wet concentration.

Not all of the uses listed can, in our opinion, be considered as economically sound applications for the hammermill. This machine cannot be expected to operate economically on abrasive feed, and it should not be so applied unless there are strong reasons for doing so. Generally this narrows itself down to cases where no other type of crusher will deliver the type of product required; occasionally the high reduction ratio of which they are capable will dictate their use in temporary jobs where the cost of a two-stage set-up of more economical operating characteristics would more than offset the cost of the single hammermill plus the expected cost of maintenance. A case in point to illustrate the latter condition is that of pilot plant testing in the development of new mining properties.

We have never subscribed to the idea that the hammermill is suited to the primary breaking of shovel-loaded, quarry-run, or mine-run rock and ore. Even though the material be nonabrasive and quite friable there are other machines which are better fitted for such work. Nor do we believe that the hammermill has a place in any of the stages of a plant intended for the production of commercial crushed stone unless the production of a high percentage of fines is not objectionable—a rather rare condition for operations of this character.

These legitimate restrictions still leave quite a broad field for this machine, and it is probable that more applications will crop up from time to time as our chemical industries grow.

Examination of 33 cement plant flowsheets, published in 1922, discloses that, at that time, only six of these plants employed hammermills, and two of these were used in the shale crushing department. Today the hammermill is widely accepted as a secondary or tertiary crusher in cement plants throughout the country; and there are isolated instances where they perform the primary breaking as well.

During World War I the Pulverator was successfully applied to the production of manufactured sand for concrete aggregates used in the construction of a large dam in one of the eastern states. This application was made after crushing rolls had been tried and discarded because their product ran so heavily to flat spalls that a workable concrete could not be made with it. We mention this case as being indicative of the ability of the hammermill to cube material, even though the rock's physical structure is conducive to spalling or flaking. Subsequent installations for the same purpose have been equally successful.

(To be continued)

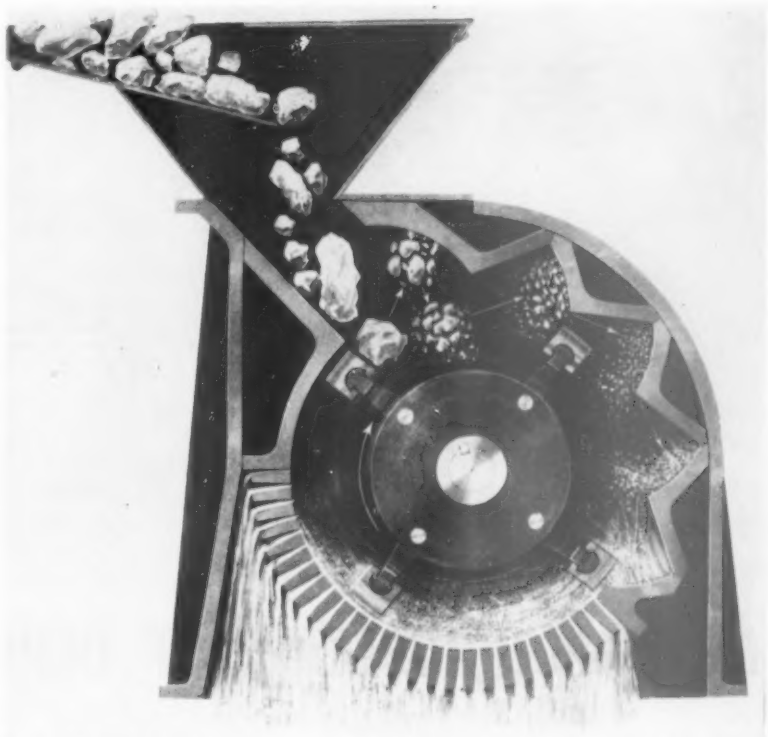
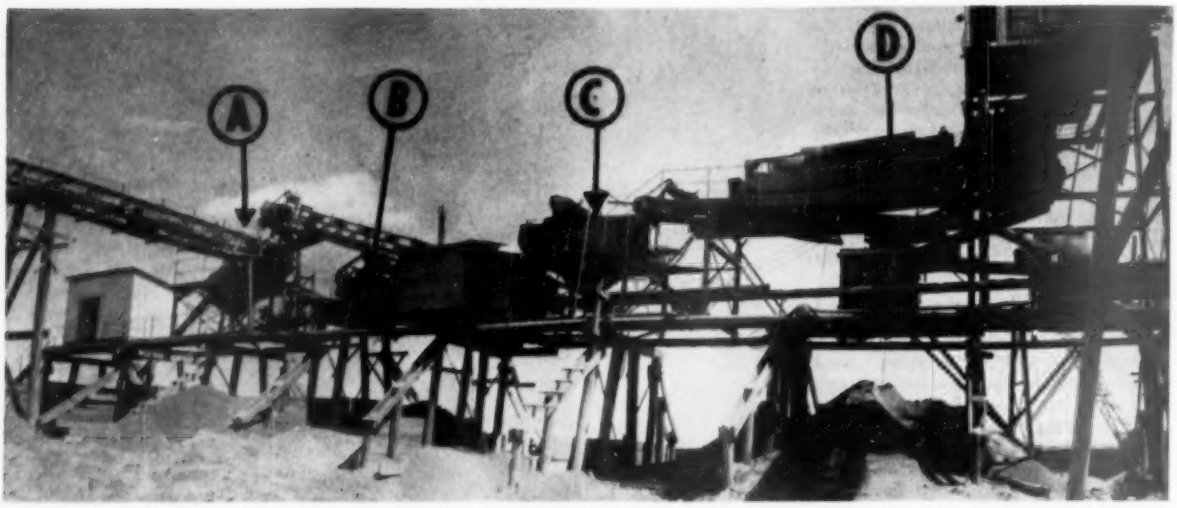


Fig. 1: Sectional view shows how material is broken down in one type of hammermill. Material is fed to an inclined plate which is fastened to the hopper over the feed opening. This plate is so arranged that the material is evenly distributed and fed uniformly to the mill. The rapidly revolving hammers (see arrows indicating direction of rotation) strike the material a succession of heavy blows, shattering it and throwing it violently against the first involute breaker plate. Striking this plate with great force, the material is again shattered and, as it rebounds, it is struck again and carried to a second involute breaker plate from where it again rebounds and so on through five stages. The pulverized product passes out through grate bars in the bottom of the machine



Washing and screening plant; A—rotary scrubber screen; B—triple-deck vibrating screen; C—discharge of log washer; D—two-deck vibrating screen

MEETING PROBLEMS OF DEPOSIT DEPLETION

Bobwyn, Texas, plant of Gifford-Hill & Co. handles about 7000 t.p.d. to reach 1500 tons daily production of sand and gravel

DEPLETION OF sand and gravel deposits, as throughout the United States, is a major problem in the Dallas-Ft. Worth area of Texas. Intense scientific prospecting for additional sources of sand and gravel has been carried on for years throughout the Coastal Plains area of the South, but economically worked deposits are becoming depleted so fast that their disappearance is in the forseeable future. Producers are forced to strip more and more overburden, or to try and process material where clay inclusions are a cost burden, to build new plants at more isolated locations, and to abandon plants in worked out areas.

Typical of the plants meeting these problems is the newer Bobwyn operation of Gifford-Hill & Co., Inc., near Seagoville, Texas. In the first place 12 to 15 ft. of clay overburden must be removed to get 13 to 15 ft. of processable material, and after it is sent to the plant about 60 percent of the material must be wasted. Thus to get 1500 t.p.d. production of sand and gravel, roughly 7000 t.p.d. must be handled in the pit. Overburden constitutes about 3500 t.p.d. of this amount.

Of the 5000 tons sent to the plant, half (mostly sand) must be pumped to waste, which requires an 8-in. Amsco counterflow pump, as well as a dragline, to impound these rejects and keep them out of the drainage system.

Over the years, Gifford-Hill in its Texas, and particularly in its Louisiana operations, depended on dredge pumps as the primary gravel excavating units; draglines of the walking Monighan type are used at some of the other operations, but the Seagoville plant departs from this company practice and uses a field belt conveyor system to transport the pit-run material to the plant. At the time of inspection the field belt conveyor system was made up of two long sections, the one near the plant a 700-ft. unit between centers, and feeding it was one 1250 ft. long between centers. It was powered with a 40-hp. motor—the maximum used on any of the belts. Feeding at an angle into this continuous arrangement of conveyors were two parallel segments, each about 800 ft. long, and spaced 110 ft. apart. One belt carries the entire load while the other is being moved to another location. The belts are 4 ply, 30 in. wide and run on Robins idlers.

One of these conveyor segments can be set up in 8 hr. with a crew of 6 to 7 men. The belts are in 550-ft. rolls which are not cut unless necessary. For handling the belt a specially designed winch has been mounted on a truck, and by means of an overhead crawl and chain block a roll can be loaded or unloaded. Mounting the roll on the shaft of the winch permits it to be unrolled or rolled up with minimum effort.

The frame supporting the carrier and return rolls is made up of short pan-like segments about 10 ft. long and placed end to end to form the main body. These pans were originally held off of the ground only a few inches, but later short steel sections were welded to the legs to place the return belt 16 in. from the ground. Mud boards are under the legs. The legs also act as a connection between pans. The take-ups are at the tail end of the belts. The pan section holding the tail pulley assembly telescopes into the adjacent pan to permit length adjustments. Once the tail pulley has been set, the pan is spotwelded to hold it firmly in position. It makes a simple and economical field belt-tightening unit.

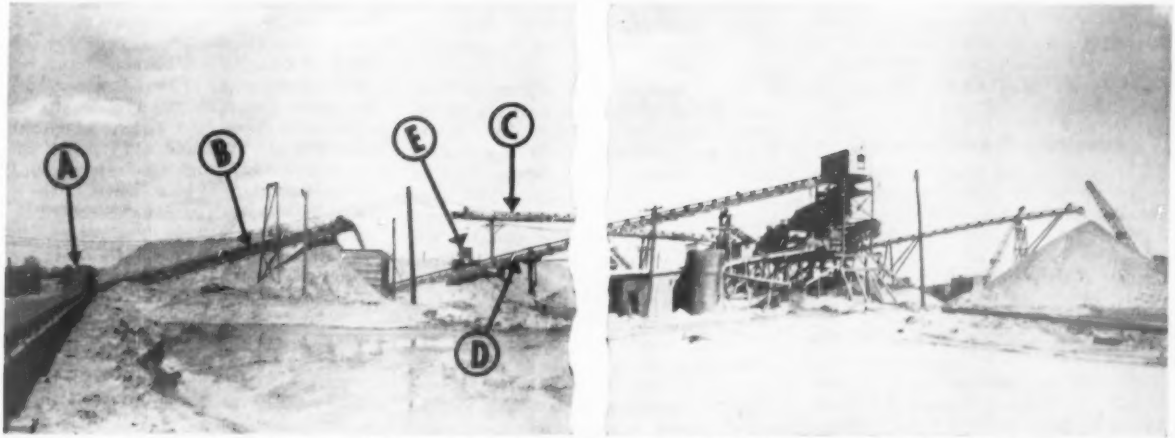
(Continued on page 104)

One of the belt conveyor sections (left) feeding into the long field conveyor; mounting the head end on cribbing aids in making the many moves required of the conveyor section

Above: Log washers, operating at relatively high speed so that gravel is washed thoroughly, discharge the material to ground storage

Below: Excavating is done by two draglines, one of which casts overburden into worked out portions of the deposit, then piles sand and gravel on the cleaned areas for draining. Second dragline (foreground) then loads the field hopper feeding the long belt conveyor

Final rinse screen over the truck hoppers; shuttle conveyor under the screen loads cars



Material received on the field belt conveyor (A) is carried on the swinging conveyor (B) which can either feed the plant belt conveyor (D) or build a stockpile alongside the feed hopper. Belt conveyor (C) builds an intermediate surge pile of material from the three-deck screen; this material is then recovered by a belt conveyor (E) operating in a tunnel and discharging to conveyor (D)

"PROSPECTIVE" CHEMISTRY OF CEMENT AND CONCRETE

Part III. Chemical combinations that form complex mineral structures

By NATHAN C. ROCKWOOD

ATOMS AND MOLECULES in a state of gas or vapor are known to be discrete or separate, and the individual electrons which compose their shells, surrounding a central nucleus in each atom, are in motion, probably vibrating or revolving both around the nucleus and spinning on their own axes, somewhat as the earth and the other planets spin on their axes and revolve about the sun. In this state, unless they are inert gases with their outermost shells filled with 8 or 18 electrons, atoms readily react with one another, sometimes spontaneously, and sometimes with the application of such outside energy as heat or an electrical discharge. The point is that the electrons must be in an activated state and free moving or have free energy in order to react chemically with one another.

Somewhat the same conditions exist when the atoms and molecules, or ions, are in a liquid or suspended in a solution. Usually, application of heat increases the mobility or solubility and facilitates chemical reactions or combinations of the ions of the elements in the liquid or solution, but there are exceptions, for example in the case of limestone, $CaCO_3$, or lime, CaO, where the solubility is slightly greater in cold water than in hot. This is because the cold water can contain more dissolved carbon dioxide (CO_2) and it is the dissolved CO_2 that reacts with the lime to form the bicarbonate $Ca(HCO_3)_2$ which is the most soluble product of the reaction.

Reactions Between Solids

The various combinations in which we are primarily interested, of silica, alumina, lime and iron oxide, are only very slightly soluble in water, although it is generally customary to account for the chemical reactions involved in the hydrating and setting of portland cement by assuming that these oxides are dissolved a minute quantity at a time, and precipitated practically instantaneously from saturated or supersaturated solutions. However, there are other ways rather than "ionic solution" in which these changes can be accounted for in the realm of colloid chemistry.

It is obvious that a chemical reaction takes place when enough heat is applied to a sizable chunk of hydraulic limestone or natural cement rock, though no part of it has been heated to a vapor or even to a liquid. Only in recent years has this kind of chemical reaction in a solid state been accounted for. The author who is most frequently quoted on this subject is Dr. J. A. Hedvall, of the Technical University, Göteborg, Sweden. He had a paper on the subject at the Symposium on the Chemistry of Cements, Stockholm, 1939,* and his investigations are referred to in Hückel's "Structural Chemistry of Inorganic Compounds," reviewed in our July issue. To understand this theory one has first to grasp the idea of mineral structures composed of three dimensional frameworks or lattices, built up primarily of packed spheres of oxygen ions (some 95 percent of the earth's lithosphere *by volume* is oxygen). These negatively charged anions are held together by oppositely charged cations (positively charged) of other elements, for example, sodium, potassium, calcium, silicon, aluminum, iron, etc., which are the most common. The cations, being much smaller, are placed in the cavities between the oxygen ion spheres.

These lattices are seldom perfect, and hence there are gaps in them, especially, for example, as where "foreign" elements enter a silica or alumina lattice; also, when some of the ions in the lattice are OH (hydroxyl) or H_2O (water). Moreover, the bonds between some elements are much more easily disrupted than in others. Ions of metals which are easily fusible or soluble, like sodium and potassium, are more easily freed of their bonds to oxygen than the more resistant calcium, aluminum, silicon or iron ions. When the bonds between ions are released by applied heat, or by solution, more extensive gaps or actual local breakups in the lattice of the combination occur, and reacting substances can enter and reorganize the oxygen ion grouping. Thus it is assumed that the lime or CaO and the minerals of the clay or shale group, which are primarily Al_2O_3 and SiO_2, react with one another without actual dissociation of either mineral into its primary elements.

The reactions begin at the surfaces of the separate particles as they come into contact with one another. In heating limestone to about 900 deg. C. the lattice structure changes from that of the carbonate (formed of rhombohedrons) to that of the oxide (formed of cubes as illustrated in out August issue, Fig. 5A). At about the same temperature, changes take place in the structural lattices of clay, which as stated is largely Al_2O_3 and SiO_2, with some water and alkali ions. The SiO_2 changes from quartz, the densest possible grouping of SiO_4 tetrahedra, to tridymite which is a more open or less dense form of SiO_4, also at a temperature of about 900 deg. C. Thus it is evident why limestone and silica or alumina react at kiln temperatures of about 1000 deg. C., since the lattices of these minerals are changing or opening up gaps at the same time. The change in both instances can best be understood by the change that takes place in densities. Thus the density (specific gravity) of limestone is about 2.9 and the apparent density of lime is about half as much or 1.6 to 1.7. The density of quartz is about 2.65 and of tridymite about 2.26. The lime (CaO) has the greater amount of free (stored-up) chemical energy, and hence it probably penetrates the gaps in the silica-alumina clay lattices. The rearrangements brought about in the coordinations of these three oxides CaO, SiO_2, Al_2O_3 result in the chief components of portland cement clinker. This regrouping of the oxygen ions is of course promoted further by at least partly melting the ingredients, which takes place in modern portland cement manufacture.

The first step appears to be the formation of $CaO{\cdot}SiO_2$ or a kind of wollastonite, $CaSiO_3$, as it is called

*Proceedings published by Ingeniorsvetenskapsakademien, Stockholm, Sweden, in 1939 (English edition).

in nature. It has been termed a metasilicate, such as would be formed from so-called metasilicic acid (H_2SiO_3). The $CaO{\cdot}SiO_2$ crystals produced in laboratory preparations by sintering limestone and silica are however not the same as the crystals in the natural mineral. This pseudo-wollastonite starts to form at around 500 deg. C., about where we have seen that the lattices of both calcium carbonate and silica may start to open up or break up. With long continued heating or higher temperatures more lime is forced into the lattice structure of the pseudo-wollastonite to form eventually what cement chemists call dicalcium and tricalcium silicates.

The basic silica structure of wollastonite (natural) is known. It is built up of rings of three silicon and nine oxygen ions, which can be represented about as shown here in Fig. 10. It is thus composed of closed rings of three SiO_4 tetrahedra joined so that each of three O is bound to two Si, giving the chemical formula Si_3O_9, which leaves an unused negative valence or binding power of 6—written $(Si_3O_9)^{-6}$. Hence, a single silica ring can take on 3 Ca, since the positive valence of 3 Ca^{+2} is 6, which gives us the geochemical formula for wollastonite $Ca_3Si_3O_9$, or chemically $CaSiO_3$, or the way cement chemists express it, $CaO{\cdot}SiO_2$, the monocalcium silicate. Wollastonite is presumed to have been formed in nature where crystalline limestone came into contact with hot igneous and siliceous rock; in other words the modern kiln process is merely an adaptation of the natural one, designed to expedite the reaction.

It makes a lot of difference in what form the silica is in originally, before its reaction with the lime. Quartz, for example, because all four O's in its tetrahedra (see the August article) are joined to the Si ions, forming an unbroken lattice, reacts with CaO very slowly and only at very high temperatures. Other forms of silica, such as chert (chalcedony) which is "fibrous" or the SiO_4 tetrahedra more or less separated into chains to start with, reacts with CaO much more readily. This probably accounts for the differences found in burning different kinds of impure limestone to make hydraulic limes and natural cements. Some argillaceous limestones contain merely fine grains of quartz, others fine grains of chert which is cryptocrystalline and fibrous, or in some instances, opaline silica, which is also a fibrous form of silica having the additional advantage that its chains or fibers are already partly separated by inclusions of H_2O (water). Also, as already noted, it is advantageous to have the silica combined as aluminum silicate (clay), for then the lattice is more open and more easily disrupted in the heating process. In addition, all clays contain some "combined" water; in clays and marls the different minerals are more intimately mixed to start with.

It is well known that if quartz is heated to a high enough temperature it becomes fibrous and eventually melts to a glass, which means the component ions do not conform to any coordination or lattice pattern. The same result is obtained when silica is "dissolved" in sodium or potassium hydroxide. The silica gel that is formed on adding acid to neutralize the solution is fibrous, as all gels are assumed to be. The strings or chains of SiO_4 tetrahedra in the gel are first separated by liquid, and on loss of the liquid the fibers come closer together and the gel combination becomes more viscous. Eventually, with loss of still more liquid, the silica tetrahedra join up in small groups, or cells, and the gel begins to crystallize. Whatever the nature of the silicate gels of hydrated portland cement, they perform much as silica gels, as we shall see in a later discussion.

Nature of Cement Clinker

Returning to the problem of chemical reactions in the solid state by the lime breaking into the lattice structures of the silica and alumina, the exact coordination of the CaO with respect to the SiO_2 and Al_2O_3, in the final product, apparently has not been determined. It is known, however, that this necessarily is much influenced by the presence of other ions, such as those of sodium, potassium, magnesium, iron, etc. Calcium ions can apparently have a coordination in respect to oxygen of 6, 8, or 10; perhaps 12. In lime, as an entity, we have seen in Fig. 5A of the August installment of this series of articles, the coordination number of calcium is 6.

Judging by the usual formulas of chemical analyses of portland cement clinker, apparently it is assumed that all of the oxygen ions in the oxides are retained during the sintering. The only oxygen lost in the sintering or kiln burning then is that combined with the carbon as CO_2, which is driven out of the limestone, and the oxygen combined as water (H_2O) or hydroxyl (OH) in the clay. It is conceivable that under reducing conditions in parts of the kiln, or temporarily existing anywhere in the kiln, when incomplete combustion produces CO, some of these oxides would be partly "reduced." That is to say some of the oxygen would be removed by the reducing agent CO to form CO_2. This is known to happen in the case of Fe_2O_3 under certain kiln conditions, resulting in FeO_2, which difference can be seen in the colors of the clinker.

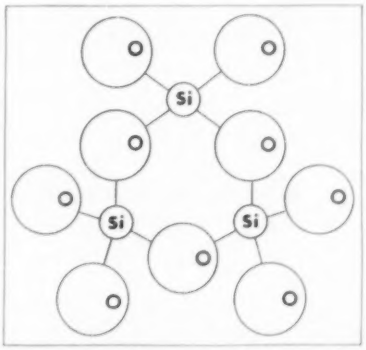


Fig. 10: Trigonal ring (SiO_2) which forms the silica structure in wollastonite—$CaSiO_3$, or $CaO{\cdot}SiO_3$, calcium monosilicate of cement chemistry

Assuming, as portland cement chemists appear to do, that all the oxygen in the original raw materials is retained in the clinker, with the exceptions noted above, the structure of the clinker must be largely a reorganization of all the packed oxygen ions, in which it is fairly certain that the silica retains its 4 coordination, since that is the only way it is found in similar natural materials. Assuming in the case of silica and lime alone, that the lime retains its 6 coordination, one could arrive at a structure for wollastonite by playing with groups of ping-pong or golf balls to represent oxygen ions, and say colored marbles to represent calcium and silicon ions. One could thus develop a structure to meet both coordinations. With the help of X-ray photographs of the mineral itself, this is about the way structural chemists develop their schematic arrangements of atoms. Obviously such a design is too complicated to be presented in any sketch by an amateur. One can readily imagine that the theoretical structure of complex mineral combinations which would also include Al_2O_3, Fe_2O_3, MgO, Na_2O, K_2O, and other possible impurities in the clay and limestone, can present problems even to the most expert structural chemists. Hence, when we come to the "structural" representation of portland cement clinker it is going to prove quite a task even to comprehend it. Moreover, investigation is apt to prove that no two tiny particles of clinker examined are of the same composition or structure. We shall probably have to be content with designations of possible structures.

Di- and Tricalcium Silicates

The artificial monocalcium silicate $CaO{\cdot}SiO_2$, or pseudo-wollastonite, $CaSiO_3$, is the intermediate product in producing the di- and tricalcium silicate $2CaO{\cdot}SiO_2$ and $3CaO{\cdot}SiO_2$ (C_2S and C_3S for short). In this connection it is interesting to note that ring formations of silicate tetrahedra are also an intermediate stage in the formation of chain or string organizations of the tetrahedra. Hence, if the trigonal rings of wollastonite were to be broken up into chains, the

(Continued on page 114)

Unloading Hoppered-Bottom Cars

Use of car shakers proves effective in reducing wasted man-hours

By T. S. ABBOTT*

PRACTICALLY ALL hoppered-bottom cars used to transport rock and related products are built with the steel plate floor (slope sheet) slanted at an angle of 30 deg. to the horizontal. This means that bulk materials, under ideal conditions, with an angle of slide of 30 deg. or less will slide out of the hopper car completely under the force of gravity. But what about all those materials that have a slide angle greater than 30 deg.? Gravity will cause only enough material to flow out of the car until the angle between the horizontal and the top surface of the material is equal to the angle of slide. The material that remains in the space between the top surface of the material and the 30 deg. steel plate floor (see Fig. 1a or 1b) will not flow out of the car under the force of gravity, but will require some other externally applied force to cause it to flow.

Table I is a listing of a number of products that may be transported in hoppered-bottom cars. After each of the products listed there is given the angle of slide, which is the angle to which a steel plate that supports the material must be tilted from the horizontal before the material will slide off due to the force of gravity. Also listed is the specific weight for each product. All of the data listed are considered to be under ideal conditions unless otherwise noted. "Under ideal conditions" means that the material is sized, there is little or no moisture and no packing. This must be kept in mind when reading and using the information in this article because there are many variables which could change the data presented here.

To illustrate the full meaning of Table I, we have expanded the angles of slide to show graphically the percent of volume of material that remains in the hopper car after the force of gravity has removed its share of the load. A typical 50-ton car, which has a volumetric capacity of 2100 cu. ft. when loaded full to the eaves, was chosen. Based on the dimensions of the car and the angle of the slide over 30 deg., the volume of material remaining in the car was computed and then divided by the volumetric capacity of 2100 cu. ft., which resulted in a percentage of full load remaining in the car. The results of these calculations, shown in Fig. 2, proved to be interesting. Note that as the angle of slide increases 1 deg., the percentage of load remaining in the car increases very close to 2 percent.

When conditions vary from the ideal, the angle of slide increases. This in turn increases the volumetric percentage of full load that will remain in the car after gravity has done its work. This is significant in view of the fact that many of the materials listed in Table I as having a slide angle of 30 deg. or less under ideal conditions will have a slide angle of 30 deg. or more when the ideal conditions are modified. Packing in transit, moisture, and partial freezing are a few of the conditions that will increase the angle of slide. For example, when absolutely dry, bituminous coal will slide at an angle of 29 deg., but when damp the angle of slide increases to 40 deg. In winter there is the danger of a hard enough freeze to prevent any material from sliding, which would necessitate thawing before the material can be removed through the hopper.

Fig. 1a, b and c represent material in a hopper car under the conditions as noted. The shaded area in the car

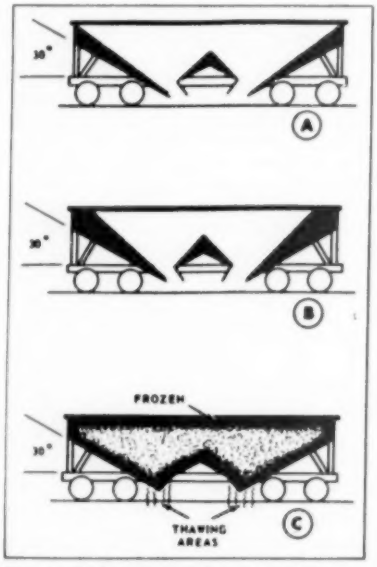


Fig. 1: Shaded areas represent material remaining in a hoppered-bottom car under different conditions: (a) dry material, (b) same material in a damp or wet condition, and (c) frozen material

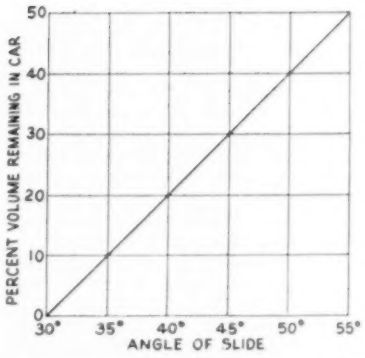


Fig. 2: Percent volume of material remaining in hoppered-bottom car after gravity has removed its share

represents the amount of material remaining after gravity has done its work and which must be removed by either manual or mechanical means. Unloading personnel would have to bang the sides of the car or actually climb into the car and dig or chop the material loose. This method is, of course, dangerous and involves considerable time. A mechanical method, such as a car shaker, involves the use of only one man at the controls—away from all danger and also a considerable saving in the amount of man-hours required to empty a car.

The graph in Fig. 2 still does not give a complete picture of just how much is involved in unloading from a hopper car the material that gravity does not remove. We all know that it is easier to move a bucket of oats than it is to move an equal volume-sized bucket of cement when both are full. Therefore, the figures obtained from the graph in Fig. 2 were expanded on a weight basis. The calculations involved three variables: (1) the specific weight (lb. per cubic foot) of different materials; (2) the slide angle; (3) the percentage load remaining in the car. A summary is given in Table II.

Here is a brief explanation of how the calculations were made; by using the same method any of the materials given in Table I can be put through the same process. The same hopper car was used, which has a volumetric capacity of 2100 cu. ft. A product was then selected from Table I and its specific weight noted. We will use ground gypsum which weighs 56 lb. per cu. ft. for our example. We then multiplied 2100 cu. ft. by 56 lb.

*Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

per cu. ft. and arrived at the total load in the car, when full and level with the top, of 117,600 lb. From Table I we note that ground gypsum has a slide angle of 40 deg. Taking this figure over to the graph in Fig. 2 we find that with a slide angle of 40 deg. there remains in the hopper car 20 percent of the load. By multiplying 117,600 lb. by 20 percent we get the weight of material remaining in the car after gravity has removed its share. The amount in this case is 23,520 lb., which is equal to 11.76 short tons. Thus, under ideal slide conditions, almost 12 tons of ground gypsum would have to be removed by either human or mechanical means after gravity has done its work.

Table I. Angle of slide and specific weights for various materials*

Description	Angle of Slide (Deg.)	Specific Weight (lb./ft.³)
Alumina, sized or briquette	22	65
Alumina, fine, granulated	35	55
Ammonium sulfate, damp, granulated	45	40
Ash, black, ground	27	105
Ash, volcanic, powdered	45	45
Ashes of bituminous coal	40	35-45
Ashes, damp	50	40-50
Barytes, granular	30	144
Bauxite, calcined (granulated without dust)	26	70
Bauxite, ground, dried	35	68
Bauxite, mine run	31	85
Bentonite, pulverized	42	50
Calcium carbide, spent, powdered	45	139
Calcium oxide, powdered	43	27
Carbon, ground	21	50
Carbon coke, crushed, sized	28	30
Chalk, precipitated, powdered	45	18
Cinders, (coal, ashes & clinkers)	35	40-45
Cinders, blast furnace	35	57
Clay, dry in lumps, loose	35	40-100
Clay, blended for tile, 11% moist, powdered	45	45
Clay, fire, powdered	45	25-80
Clay pulverized, fire brick	35	100
Coal, anthracite, broken of any size, loose	22	52-57
Coal, anthracite, chestnut	22	46
Coal, bituminous, minus ¼ in. slack dry	29	40-50
Coke, pulverized	34	25
Coke, petroleum, crushed	27	33-36
Cryolite ½ in. to 200 mesh, crushed	32	52
Dolomite, pulverized	41	46
Dust, flue, blast furnace	45	40
Dust, limestone	38	55-65
Earth, fullers, raw	35	42
Feldspar (crushed)	32	100
Gravel	30	120
Green stone, trap, quarried in loose piles	35	107
Gypsum	45	142
Gypsum in irregular lumps	30	82
Gypsum, ground	40	56
Ilmenite, granulated	31	148
Ilmenite, fine ground	40	120
Lime, briquette	26	60
Lime, burned, pebble (sized)	30	53
Lime, fine (spent dry carbide)	40	45
Limestone, pulverized	42	85
Limestone, mixed sizes	35	105
Limestone, coarse, sized	25	98
Mica, ground	36	13½
Phosphate, Florida 20 mesh, air cleaned	27	93
Pumice, pulverized	45	40
Rock, phosphate, pulverized	40	60
Sand, pit-run	35	90-120
Sand, coarse sized	30	90-100
Sand, very fine	32	90-110
Sand, core	39	65
Sand, voids full of water	45	110-130
Silica, flour	45	80
Slag, furnace, granulated	25	122
Slag, Birmingham	25	82
Slate, fine ground	35	82
Slate, granules, flaky	28	87
Soapstone, fine ground	40	60
Stucco (tubed & untubed) powdered	36-38	50
Sulfur, coarse	32	76
Talc, micaceous granulated	36	62
Tripoli (powdered)	40	80
Wool, mineral	30	20
Zonolite, fine, granular	30	7

*Taken from General Catalog No. 55, Stephens-Adamson Mfg. Co., Aurora, Ill.

Table II. Relationship of slide angle and specific weight with weight of material remaining in car

Slide angle (degrees)	Percent volume remaining in car from Fig. 2	Specific weight lb./ft.³	Weight remaining in car (lb.)
33	6	5	630
33	6	20	2,520
33	6	30	3,780
33	6	50	6,300
33	6	60	7,560
40	15	5	1,757
40	15	20	6,300
40	15	30	9,450
40	15	50	15,750
40	15	60	18,900
50	40	5	4,200
50	40	20	16,800
50	40	30	23,200
50	40	50	42,000
50	40	60	50,400

When considering a problem such as presented here, another factor must be considered before drawing any conclusions. That factor is the weight limit of the hopper car. For instance a car may have a volumetric capacity of 2100 cu. ft. with a nominal load limit of 100,000 lb. and a maximum load limit of 129,100 lb. This means that on the basis of the nominal load limit (100,000 lb.) any material weighing more than 47.6 lb. per cu. ft. should not be loaded full and level with the top of the car, and on the basis of the maximum load limit (129,100 lb.) any material weighing more than 61.5 lb. per cu. ft. should not be loaded full and level with the top of the hopper car. This fact has a very interesting effect on the results obtained for some of the materials. For example, if the car could not be loaded full and level, there would be a smaller total volume of material in the car. Therefore, less material would flow out by gravity and by the same token there might be less material remaining in the car, depending upon the angle of slide and the slide conditions. However, because of the higher specific weight of the material there might be a higher total weight of material remaining in the car than there would be for a lighter product that could completely fill the hopper car.

In order to analyze easily what happens when the slide angle or specific weight varies, Table II has been prepared. The same range of specific weights was used with varying slide angles, therefore, the effect that varying either the slide angle or specific weight has on the total weight of material remaining in the car can be quickly determined.

The car shaker, when set on the eaves of the car, will cause the bottom sheets to vibrate through a small amplitude. This vibration causes the material to feed down along the sheets to the openings. Proper centrifugal force and shaker speed will result in quicker unloading without damage to car or to track supporting structure.

To show what actually can be accomplished with a car shaker, we will briefly review the situation at a large manufacturing plant. This plant utilizes one of the earliest models of a car shaker in the unloading of coal for use in its powerhouse. The flow of the coal is roughly as follows: The hopper car full of coal is spotted over a hopper which has a capacity of approximately 10 tons. The coal is dropped into the hopper and from there it feeds into a crusher. After the crushing operation, it is discharged into a bucket elevator. The coal is then discharged onto a conveyor which carries it to bunkers for use.

Before the car shaker was installed, three men were permanently assigned to empty the hopper cars, and during the winter months two additional men were assigned. Thus, three to five men, depending upon the conditions, were continuously working to keep enough coal flowing out of the hopper cars so that a sufficient amount of coal was continuously available at the bunkers. The time required to empty a 50-ton car averaged about 1¼ hr., with variations from that figure depending upon conditions. Using the average time, in summer it required 3¾ man-hours and in the winter it required 6¼ man-hours to empty one hopper car. Unloading by this method often necessitated the men climbing into the car and doing their pounding, digging and chopping on the material while they were standing on it. Needless to say, the accident rate on this job was the highest of all the power plant activities.

Since the car shaker was installed, only one man has been permanently assigned to emptying the hopper cars. During severe cold weather when freezing of the material takes place, a second man is assigned to handle the thawing operation.

The actual limitation on the car shaker at this installation is dictated by the capacity of the conveying facilities. The size of the receiving hopper, the capacity of the crusher, the bucket elevator and the conveyor do not allow an entire hopper car to be unloaded at one time.

If it were not for the limitations imposed on the car shaker by the

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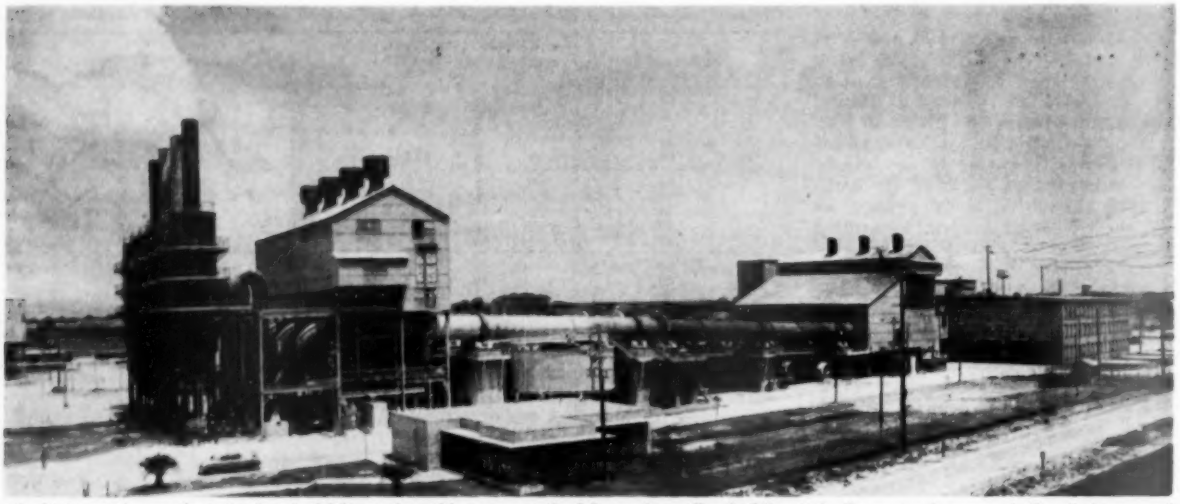


Ideal's Baton Rouge plant. Feed end of kilns and scrubbers are at the left; modern office building is in the center foreground. The discharge end of the kilns, garage and machine shop are shown at right

PRODUCING CEMENT FROM OYSTER SHELLS

Baton Rouge plant of Ideal Cement Co. increases company's over-all production to 19,000,000 barrels per year

By WALTER B. LENHART

THE NEW WET process plant of Ideal Cement Co. at Baton Rouge, La., completes another phase of an extensive postwar expansion program in which the company has spent over $32,000,000 for new plant facilities and additions and alterations to existing plants.

The Baton Rouge plant was originally built during the early part of World War II by the Defense Plants Corp. under the direction of the Aluminum Ore Co. for processing domestic low-grade bauxite at a time when it appeared that the submarine menace might cut off shipments of high-grade bauxite from South America. The general arrangement of the plant and the equipment was very similar to that of the plant at Mobile, Ala., which Ideal purchased in 1946 and converted for the manufacture of portland cement (see ROCK PRODUCTS, August, 1947, page 138). The plant was purchased late in the fall of 1950, and the main units and buildings could readily be converted for the manufacture of cement. Work on the conversion was started almost immediately after its purchase, and the first kiln was put into operation in August, 1951.

Location

The plant is situated on the east bank of the Mississippi river about seven miles north of downtown Baton Rouge in a relatively new industrial area. The location on the river affords excellent water transportation facilities for bringing in oyster shells which are used as the primary raw material, as well as for shipments of cement either up or down the Mississippi. The oyster shells are dredged from Lake Pontchartrain and from certain areas of the Gulf of Mexico. At the present time, the installation of a Washington Iron Works hammerhead crane, with a working radius of 90 ft., is nearing completion at the water front for handling shell which is delivered by barges. This crane will be equipped with a 6-cu. yd. Owens clamshell bucket and is expected to unload shell at a rate of 300 cu. yd. per hr. The installation of this crane was included in the original conversion plans, but since the conditions of the river limit construction to only a relatively short period of time during the summer when the level is low enough to allow the work to proceed, its completion has been delayed. In the meantime, shell have been delivered to the plant by rail so that the starting of operations was not held up waiting for the completion of the hammerhead crane. This work at the water front is being done by W. Horace Williams Co. of New Orleans.

When the crane installation is completed, the bucket will discharge into a hopper under which a Jeffrey vibrating feeder will feed a 30-in. inclined belt conveyor which will discharge onto a second 30-in. belt conveyor which operates in a concrete gallery over the storage area. This belt is equipped with a self-propelled tripper which is used to distribute the shell over the storage pile, which has a capacity of about 100,000 tons of shell. The shell are reclaimed from the storage pile through nine gravity feed gates onto another 30-in. belt conveyor and transported to two No. 5040 Dixie hammermills which were in the original installation. The belt conveyors and equipment were furnished by Continental Gin Co. The concrete piers and gallery for the belt over the storage area were constructed by J. T. McDowell and Sons, Denver, Colo. The product from the hammermills, approximately ¾ in. size, is transported to three concrete storage silos immediately ahead of the raw mills by an existing 24-in. belt conveyor. This crushing and conveying system was to have been used in the original installation for crushing limestone which was used in the sintering process.

Clay

Clay is supplied from a company-owned deposit on the west side of the river about eight miles from the plant and is hauled to the plant by trucks. It is unloaded into a rectangular concrete soaking pit which was designed to aid in dispersing the sticky material. A 2-cu. yd. Sauerman crescent scraper operates in the pit, draw-

ing the clay to the duplex wash mills. Each mill is 24 ft. in diameter and equipped with eight harrows for breaking up and dispersing the clay. The clay slip is elevated by a small bucket elevator and screened over a 4- x 8-ft. Gyro-set vibrating screen to remove roots and other foreign material, after which it is pumped by a 6-in. Type C Wilfley pump to a 40 ft. dia. x 25 ft. high storage tank. This tank is equipped with a Dorr agitator, and air is supplied for additional agitation by a C-60 Fuller rotary compressor. From this tank the clay is pumped by a 3-in. Type CA Wilfley pump to three ferris wheel feeders for proportioning to the raw mills.

Raw Grinding

Three 7- x 40-ft. three-compartment F. L. Smidth mills are used for raw grinding. The crushed shell are fed to the mills by Jeffrey vibrating feeders and screw feeders through the journals of the mills. Each mill is driven by a 700-hp. Electric Machinery Co. synchronous motor. At the discharge end of each mill is a 6-in. Type C Wilfley pump which pumps the slurry to one of three correcting tanks which are 40 ft. in diameter and 25 ft. high. From these tanks the corrected mix is pumped to four kiln feed tanks which are 40 ft. in diameter and 15 ft. high. All slurry tanks are equipped with Dorr agitators, and air for agitation is furnished by three C-150 Fuller rotary compressors. The slurry is pumped to the ferris wheel kiln feeders by one of two 5-in. Type K Wilfley pumps, one pump being maintained as a spare unit.

Kilns

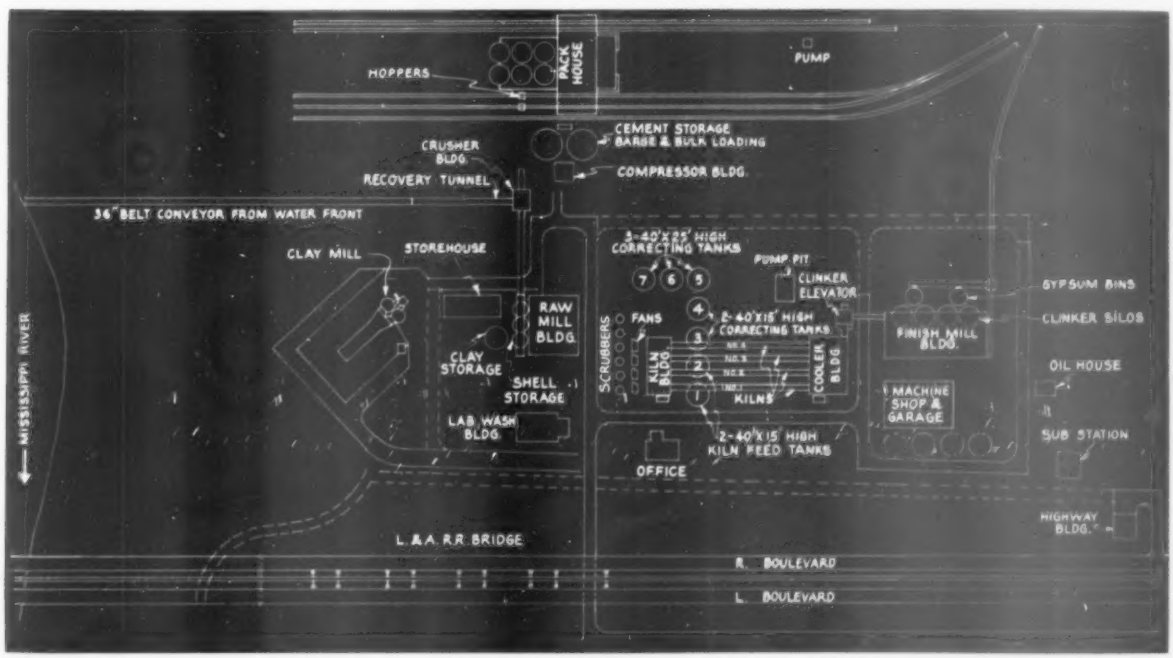
There are four kilns in operation; three are 9 ft. 6 in. x 250 ft. and the fourth is 10 x 250 ft. All are Traylor kilns and each is equipped with a 4-ft. 6-in. x 60-ft. Allis-Chalmers air-quenching cooler. The 9-ft. 6-in. kilns have a capacity of 1500 bbl. per day and the 10-ft. kiln a capacity of 1700 bbl. Natural gas purchased from the Interstate Natural Gas Co. of Monroe, La., is used for fuel.

Clay soaking pit, with wash mills in the background

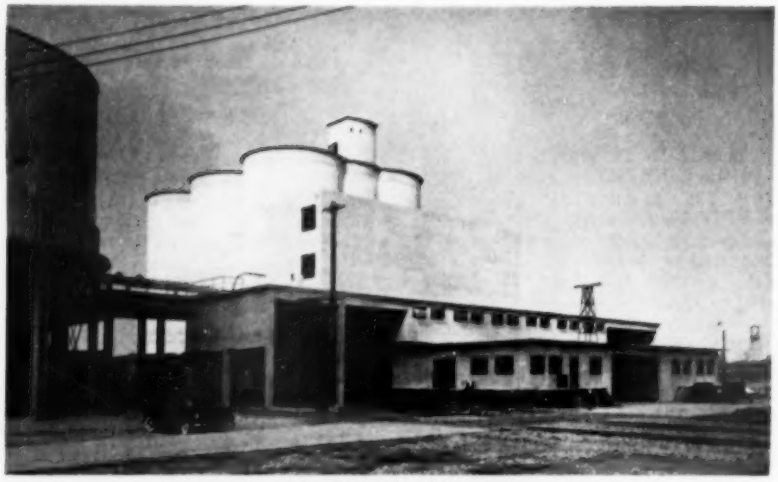
The linings of the kilns are as follows, starting from the discharge end: 5 ft. of 40 percent alumina liners, 10 ft. of 70 percent liners, 35 ft. of Magnecon (burned magnesite) liners, 30 ft. of 70 percent liners, 107 ft. of 40 percent liners, all of which are 6 in. thick. Following the refractory lining is a 7-ft. section lined with 4 in. of grout which was reserved for an additional chain section if it were required. Following this is a chain section 42 ft. long consisting of approximately 5400 ft. of ¾-in. chain in loops. There is no lining in the balance of the kiln (14 ft.) to the feed end.

Instrumentation

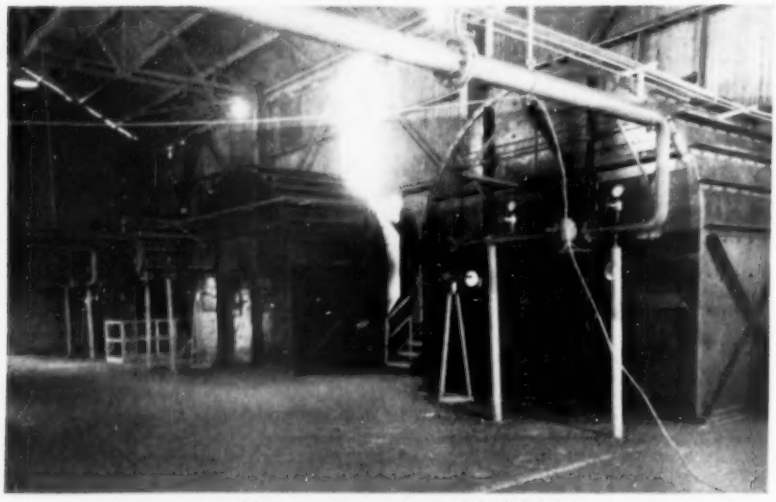
Each kiln is equipped with a control and instrument panel. Instruments include a Leeds & Northrup Rayotube and Micromax recorder for indicating and recording hot zone temperatures, a Leeds & Northrup Speedomax recorder which records the kiln exit gas temperature, a Weston tachometer for indicating the speed of the kiln feeders, a Hays automatic CO_2 analyzer, two Hays draft gauges,



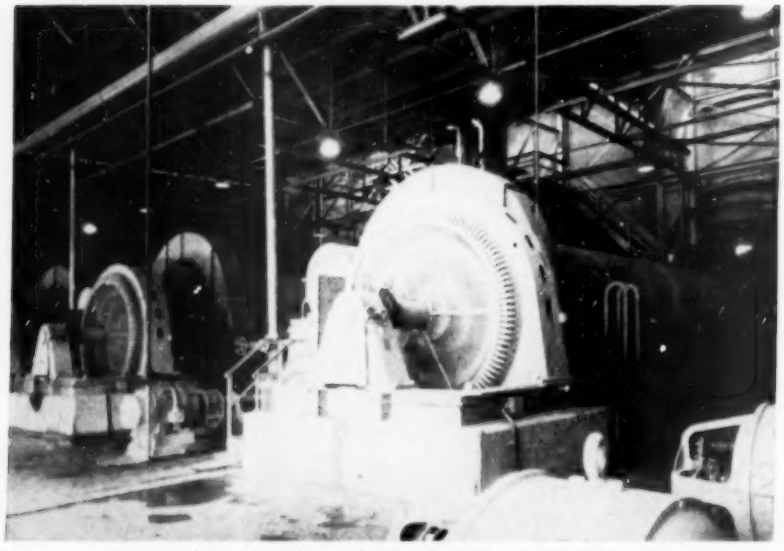
General plan of Baton Rouge plant



Storage silos and packhouse at the Baton Rouge plant



View of kiln room showing three of the kiln hoods



View of the raw mill room showing the discharge end of the mills

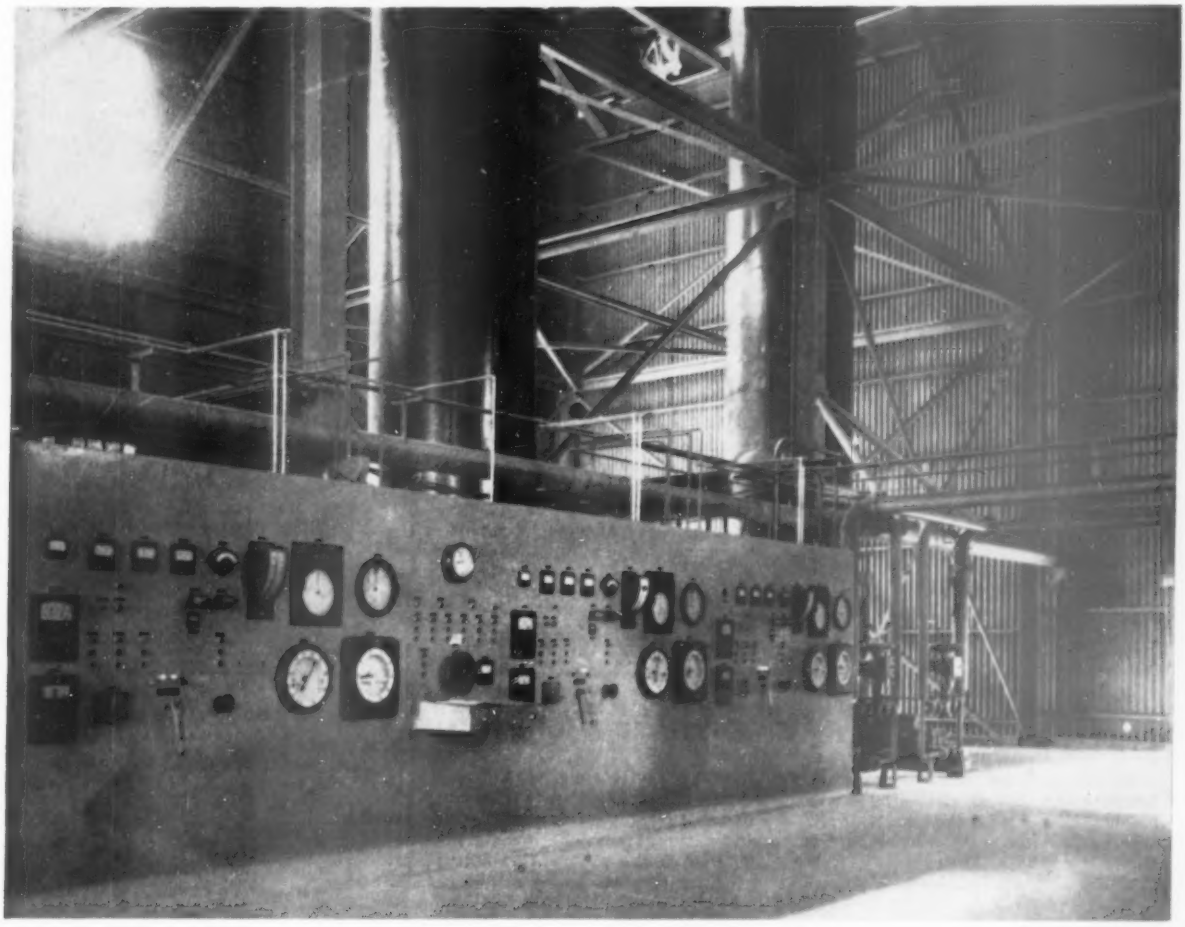
one for indicating the draft at the hood and the other for the differential between the hood and the dust chamber, and two Veeder-Root magnetic counters for the kiln and feeder revolutions. Fuel gas flow is recorded by a Foxboro integrating flow meter on each kiln. Draft fan dampers are positioned by Leeds & Northrup positioners by remote control from the panel. On No. 4 kiln, a Hays automatic oxygen analyzer is being used instead of a CO_2 analyzer.

The kilns are driven by 100-hp. slip ring General Electric motors with four speed controllers and with the maximum kiln speed being 76 r.p.h. The kilns each have four tires and are sloped at ½ in. per ft. A 100,000 c.f.m. American Blower Type SE induced draft fan is connected to each kiln, and the gases are discharged into a wet steel scrubber. The scrubbers are 77 ft. 9 in. high and 15 in. in diameter, and the dust-laden gases are subjected to an intensive water spray system which removes essentially all of the dust. The discharge from the bottom of the scrubbers is pumped to a tailings area by a 4-in. Morris centrifugal pump.

The clinker from the coolers is conveyed by a drag chain-elevator-belt conveyor system to four concrete storage bins immediately ahead of the finish mills. Duplicate conveying equipment is provided so that routine periodic inspections can be made of the equipment to minimize lost time. Two additional concrete bins for storage of gypsum were constructed. Gypsum is received by rail and transported to the storage bins by means of an undertrack hopper, an elevator, and a belt conveyor.

Finish Grinding

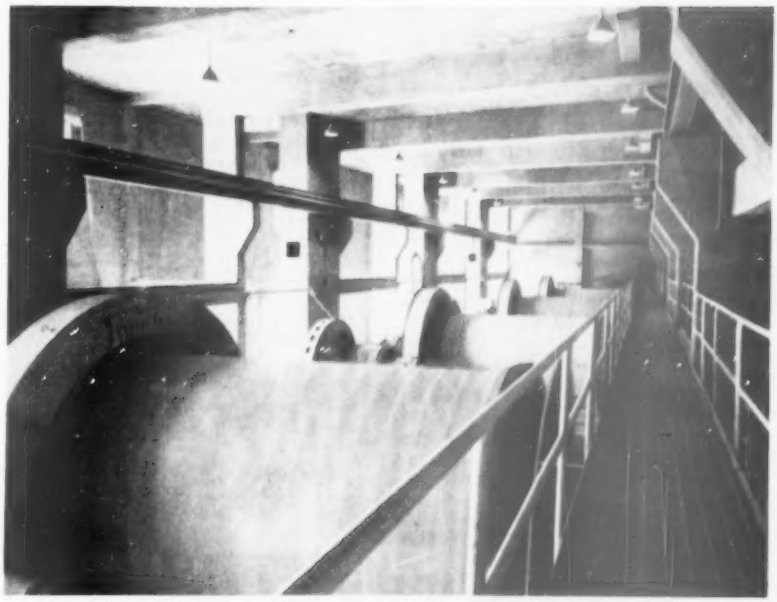
The finish mills include three 8- x 16-ft. Traylor two-compartment mills and a 9½- x 16-ft. Traylor single-compartment mill. Two Merrick Feedoweights are used on each mill to proportion clinker and gypsum. The 8- x 16-ft. mills are close circuited with 14-ft. Sturtevant separators and the 9½- x 16-ft. mill close circuited with a 16-ft. separator so that each mill is on an individual basis. The 8- x 16-ft. mills are driven by 450-hp. Electric Machinery synchronous motors, and the 9½- x 16-ft. mill is driven by an 800-hp. General Electric synchronous motor. The finished cement is pumped approximately 1100 ft. to the storage silos by an 8-in. Fuller-Kinyon pump with air being supplied by two C-150 Fuller rotary compressors. Dust collectors are provided for each finish mill, Norblo No. 312A collectors for the 8- x 16-ft. mills and a Norblo No. 390A for the 9½- x 16-ft. mill. A rigid frame monolithic concrete building houses the finish mills.



Above: Control and instrument panel in the kiln room

Cement storage consists of six new 35 ft. dia. x 85 ft. high monolithic concrete silos and two steel tanks, originally installed in the plant for the storage of soda ash and which have a capacity of about 17,000 bbl. each, giving a total storage capacity of about 155,000 bbl. The concrete silos and the adjacent packhouse were also constructed by J. T. McDowell and Sons. Cement stored in the steel tanks is used for bulk rail shipments or for loading cement barges at the river. At the present time, Ideal has two 7500-bbl. self-unloading cement barges which were built by the Ingalls Shipbuilding Corp. of Birmingham for transporting cement to the New Orleans terminal (see ROCK PRODUCTS, June, 1952, page 114). Two additional barges are being built by Ingalls, and three 5000-bbl. contractor's barges are being built by the St. Louis Shipbuilding and Steel Co. A 10-in. Fuller-Kinyon pump and a 12-in. pipeline are used for loading the barges. Air for this pump is furnished by three C-250 Fuller rotary compressors.

Cement is drawn from the concrete storage silos by means of Fuller-Huron Airslides and transported to



The finish mill room is of monolithic concrete construction

the packer bins by collection screws and elevators. There are three four-tube St. Regis packers, each served by an individual bucket elevator that discharges over a 2- x 5-ft. Selectro screen into the packer bin. Transportation of the filled bags to the cars is accomplished with Flexoveyors. Controllers for the operations of the conveying system and the packing machines are mounted on a small panel at each packer. There are five Norblo dust collectors in use at the packhouse.

Most of the existing buildings have been put to use for various purposes, one being converted into a wash and change room and plant laboratory, another being used as a storeroom, and a third as a garage and machine shop. However, a new monolithic concrete office building was constructed to take care of the needs of the plant office personnel. The district sales office for Louisiana is located in New Orleans.

Personnel

Details of the purchase of the plant equipment and property were handled by the following company officials: C. K. Boettcher, chairman of the board; Cris Dobbins, president; and M. O. Matthews, executive vice-president. Conversion of the plant was under the direction of Thomas B. Douglas, general superintendent. The engineering work for the conversion was done cooperatively by Ideal's engineering department under the general supervision of George Wiley, general engineer, and the engineering staff of the Stearns-Roger Manufacturing Co. of Denver. The construction work, aside from that which has been mentioned above, was done by Stearns-Roger. Operations at the plant are under the direction of Harley Fleming, division superintendent, and D. E. Koch, plant manager. Other plant personnel include Guy Friday, assistant plant manager; T. J. Johnson, plant engineer; and Warren Brown, chief chemist.

New monolithic concrete office building at the plant

A LOOK AT THE NEW BOOKS

Quarrying Stone for Construction Projects, by Ir. H. Streefkerk, 159 pages, Uitgeverij Waltman, Delft, The Netherlands (distributed by Van Riemsdyck Book Service, Inc., 207-211 East 37th St., New York 16, N.Y.), 1952, $5.00.

THOUGH THIS book was written and published in The Netherlands, it describes principally quarry practices in the United States. Some parallel European practices are presented, but only incidently. The book is printed in English. Coverage of types of deposits, exploration, rock structure, and drilling is quite comprehensive. The author states that blasting practices are not included in great detail because of the existence of du Pont's "Blasters' Handbook." Crushing and screening is considered out of the scope of the book, though these processes have not been neglected where they affect development of the quarry. A lot of minor irritations occur in the author's wording which readers should reconcile themselves to (e.g., use of ± to mean approximately) but there is much of value to be obtained from this little volume.

Exhaust Hoods, by J. M. DallaValle, 141 pages, The Industrial Press, 148 Lafayette St., New York 13, N.Y., $3.50.

THE AUTHOR, professor of chemical engineering at Georgia Institute of Technology, has expanded a series of research reports originally published in *Heating and Ventilating* into a treatise of the theory and practical design of exhaust hoods. Since actual installation requirements vary so widely, probably the most valuable portion of the book is the description of fundamentals to be considered in hood design. Little of direct application in the rock products industries is covered specifically in this book, but among those subjects discussed are asbestos handling, enclosed vibrating screen dust control, control of dust in rock drilling, and enclosed belt conveyors. Any producer operating extensive equipment repair facilities involving dust or fume removal would find this book of more assistance, in many cases.

Prestressed Concrete Structures, 261 pp., McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y., 1952, $6.

SPECIFIC DATA, theories and case histories on prestressing are gathered together by August E. Komendant in "Prestressed Concrete Structures." Intended to serve as a comprehensive reference and guide for analyzing and designing various types of prestressed structures, the book covers continuous beams, trussed girders and shells, as well as simple prestressed beams and slabs.

The first chapter provides a general explanation of prestressing principles, along with systems and applicable methods and cost factors. The second chapter deals with materials and those properties especially important in prestressing. The major portion of the book is concerned with design theories and methods for analyzing the load carrying capacities of various prestressed systems.

More than a dozen representative prestressed structures in the United States and abroad are analyzed; these include bridges, tanks, reservoirs, airplane hangers, a dam, an experimental airfield runway, and pavement.

For those with little background in statics and mathematics, several numerical examples are provided that demonstrate the application of stress analysis methods.

Of particular interest to our readers is the section covering design of prestressed concrete pipe, and the design of a mix for watertight concrete. Those case histories of special interest include five highway bridges over the Marne river at Esbly, France. Each bridge is composed of six I-shaped two-hinged arch ribs which were precast in 6-ft. segments at a central plant. The experimental prestressed concrete runway for the Paris airfield at Orly, France, is of interest since it utilized square precast slabs in its construction; the slabs were 39 x 39 x 6.33 in.

Prestressed concrete pressure pipe for the Chain of Rocks canal project on the Mississippi river at Granite City, Ill., are also described. The pipe were manufactured by the Rocla roller suspension method. Prestressing was applied to each pipe core by a special wire-winding machine. The wire was applied spirally in a basket-weave design and turned back around small anchor pins at the ends of the cores. Thus the cores were prestressed both circumferentially and longitudinally at the same time.

European Developments in Use and Processing of Glass Sands

Emphasis on grading in its effects on melting properties in glass furnace; beneficiation processes highly developed with emphasis on iron removal

By B. M. PEARSON*

GLASS SANDS to be satisfactory must meet certain requirements which the glass manufacturer insists on from necessity. The first requirement is purity. This primarily implies almost entire freedom from iron oxides. In the production of what is termed colorless glass, i.e., the ordinary white glass produced in large quantities for glass container manufacture, plate glass, etc., the presence of iron oxide in any quantity exceeding approximately 0.05 percent tends to color the glass greenish. This is obviously undesirable if the aim is to produce a white, colorless glass. During the melting process, there is a certain amount of iron pick-up from refractory solution and there is a further quantity of iron oxide introduced in various ways, such as dirt. As the silica content of glass is roughly three-quarters of the composition, the permissible amount of iron oxide in a good white glass sand is strictly limited. In actual practice, it is usually best to use a glass sand containing not more than 0.03 percent iron oxide.

Mineralogical Composition

A second requirement is the proper mineralogical composition of the sand and the grain size (granulometric analysis). Often, the mineralogical composition will decide the iron content; thus, the presence of glauconite in any quantity, which is an iron-bearing mineral, will invariably mean contamination of the sand with iron. The mineralogical composition will also determine whether the sand can be given a beneficiation treatment or whether it wouldn't be worth while to do this. For example, if the iron oxide in the sand is present as limonite, which is soft and occurs most frequently, having originated from sedimentation of iron-bearing waters on to the sand, it will exist as a coating on the quartz grains. This will mean that with suitable treatment the coating can be removed and the iron oxide content of the sand reduced considerably.

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Grain Size of Glass Sands

The grain size of the sand (the granulometric analysis) will also be of vital interest to the glass manufacturer. Normal design of glass furnaces makes an excessively fine grain size undesirable, for too much "dust" will be swept out of the furnace by the combustion gases into the regenerator chambers. This is bad for two reasons—there is considerable loss of material in the course of time and, more serious, the checkerwork of the regenerators rapidly becomes blocked, necessitating closing the furnace down earlier than might otherwise be required to clear these out; in addition, even before the blocked checkers are cleared, partial blockage which will always be present in the furnace after it has been operating a short time will make the furnace operate very inefficiently.

Opinion is somewhat divided among glass technicians regarding the actual effect of the grain size of the sand on the glass melting speed. R. Schmidt,[1] in discussing this point, states that it should not be thought that the employment of very fine sand (quartz flour) reduces the total duration of the melting of a glass batch. Actually, in the case of ordinary glasses, the employment of a very fine sand causes too rapid an action of the alkalies on the silica. This results in the viscosity of the semi-molten mixture increasing rapidly to such a degree that the removal of entrapped gas bubbles during refining becomes impossible.

To sum up, it can be said that a glass-melting mixture with a very fine sand melts rapidly, but that the duration of the refining is increased appreciably, so that the total effect is that the complete time of the glass melting (including the requisite refining) is greater than with a sand of average grain size.

The most satisfactory particle size distribution is from 0.1 to 0.5 mm.; with the largest fraction between 0.4 to 0.5 mm.

The shape of the grains similarly enters into this consideration of the melting characteristics of the sand, along with the crystalline variety of the sand; it would seem in this respect that β-quartz tends to facilitate melting of the glass. Grain size of the constituents other than the sand has much less influence on the melting. However, one broad principle must be observed; this is the necessity of avoiding use of raw materials having the same degree of fineness. In addition, it should be borne in mind that it is not the very fine grinding of materials that fuse with difficulty which improves the melting, but rather a balanced melting mixture.

The grain size of the lime or limestone used for the melting mixture, for instance, will be influenced by the particle size of the sand. A sand whose grain size is less than 0.2 mm. calls for lime or limestone having a particle size less than 0.1 mm. With a sand of grain size 0.2-0.3 mm. (main fraction), the lime should have a particle size of 0.1-0.3 mm. With sand of grain size 0.3-0.5 mm. the lime particle size should be between 0.5 and 1.0 mm. A particle size higher than 1 mm. should be exceptional for the limestone, and a size less than 0.1 mm. should only correspond to the existence of a fraction of the sand having a grain size diameter less than 0.2 mm.

Fine Grained Glass Sands

The above concept that a fine grained glass sand melts more rapidly than a larger grain size sand has also been confirmed by J. P. Poole[2]. This work-

er developed an attrition grinding process for beneficiating a western Pennsylvania soft sandstone. Various beneficiation processes had been tried and the conclusion was drawn from pilot plant tests that attrition grinding resulting in a product of 95 percent 150 mesh was the most economical and dependable of the processes tried. This process is successful only when size reduction is the result of attrition. The sand product resulting from this is necessarily fine grained; modified coarse grained batch handling techniques are therefore required before it can be used in a glass furnace. As pointed out above, with a fine grained sand of this nature, correct size matching of the soda and the lime to the fine sand is necessary. Tests have shown that this fine a sand can be used in a glass furnace; under proper conditions, an increased rate of melting will result.

Sand Grading Classification

As will be seen from the above, considerable attention is being given to the grading classification of glass sands because of the characteristic effect on the melting properties in the glass furnace. Obtaining glass sand of suitable grading by grinding and separation of particles of undesired size has been studied by M. M. Fine[3].

For a glass sand used for making colorless glass for bottle manufacture, the ideal gradation is given by Owens-Illinois Glass Co. as follows:

Dimensions (mm.)	Percentage
Plus 0.50	1-2
0.30-0.50	25-30
0.17-0.30	30-40
Minus 0.17	Less than 30 (at most 36 and with less than 1-2 percent of minus 0.07 mm. size)

A laboratory study was made of the procedures satisfactory to glassmakers. In general, the process was as follows. The raw sand was passed to a hydraulic classifier which eliminated the grains of a diameter greater than 0.50 mm. The coarse grained sand rejected was passed to a grinder and then returned to the hydraulic classifier. From this the sand was passed to the final separation tank.

Three types of rotary grinders were tried: (1) ball mill with porcelain or silex balls; (2) rod mill with steel rods; and (3) ball mill with steel balls. In the latter two cases, the sandy mass was rendered alkaline (pH 9-9.6) to diminish contamination by iron.

The tests showed that the ball mill with steel balls was the best mill for the purpose, having the highest output and, other things remaining equal, having the lowest power consumption.

Table I gives the results obtained.

The waste (fine sand) is only 9.2 percent. The Fe_2O_3 content of the sand in the initial state was 0.025 percent; the iron oxide content of the sand obtained was 0.020 percent.

Table I. Results of laboratory tests

Dimensions (mm.)	Percent by weight: Raw sand	Portion of coarse grained sand after grinding	Coarse grained sand eliminated by hydraulic classification	Sand finally obtained	Fine sand and impurities finally eliminated
Plus 0.50	48.7	26.2	47.2	2.6	—
0.30-0.50	28.2	33.6	36.8	24.7	—
0.17-0.30	17.9	24.5	12.9	45.2	—
0.15-0.17	3.5	5.7	1.9	11.4	0.5
0.07-0.15	1.6	6.1	1.0	13.8	12.8
Minus 0.07	0.1	3.9	0.2	2.3	86.7
Totals	100.0	100.0	100.0	100.0	100.0

The treatment procedure is simple and gives an average fine sand which is perfectly suitable to the glass industry for bottle manufacture.

Mineralogical Content of Sand

To develop successfully a beneficiation process for a glass sand, it is necessary to know both the mineralogical content and also the nature of the iron distribution in the sand. For example, if the iron oxide fraction consists of a soft coating on the quartz grains, this is fairly easily removed and even a normal washing treatment with water may serve to reduce the iron oxide considerably. On the other hand, if the iron oxide is contained in the form of hard mineral particles, simple washing will no longer be effective—either a flotation process or even a grinding-classification process may then become necessary.

Comprehensive tables for determining the minerals generally found in sand have been prepared by W. Schutz[4]. The grouping treatment of the minerals given in the table is to classify them in order of their increasing density. The densities and refractive indices are given by graphs. The minerals 1 to 7a given in this table are lighter than bromoform (2.88 sp. gr.) and are practically free of coloring oxides. With the exception of the argillaceous minerals, they are relatively easy to melt.

The minerals of the second group, which are numbered 7b to 22, embody, at least partly, coloring oxides and are very resistant to the attack of molten glass. They have a density less than 4.1.

The minerals of the third group, numbered 23 to 29, comprise essentially the coloring oxides and these, practically, are not decomposed during the melting of the glass.

This breakdown of the components into three groups, obtained by a gravimetric separation by means of liquids of suitable specific gravity, will suffice most often to evaluate a sand. A more intensive identification can subsequently be made either optically or by chemical analysis. A mineralogical analysis of the sand conducted in this manner, compared with a simple chemical analysis, gives a better over-all picture of the possibilities of mechanical treatment of the sand and of its melting characteristics.

Clay minerals present in a glass sand are objectionable. K. Dinger,[5] in discussing this, says that certain difficulties in the melting of the glass batch were found to be due to variations in the content of clay present in the sand. The development of a rapid method of assessing this amount was studied.

It is known that when a non-washed sand is put into a glass containing water, and the liquid is allowed to rest after agitation, a turbulent coating results due to the quantity of clay associated with the sand. It was thought that the thickness of this coating would permit evaluation, at least approximately, of the clay content of the sand.

The analysis of the substance producing the cloudiness, from tests conducted on two sands, first showed that this substance consisted principally of silica (69.45 and 51.51 percent) and that the content of R_2O_3 (Al_2O_3 + Fe_2O_3) was relatively low (8.35 and 6.42 percent, respectively).

There is no relation between the calculated contents of the sand in R_2O_3, one made on the basis of the R_2O_3 content of the substance producing the turbulence, and the other by direct chemical analysis. This result is not surprising since, as determined by chemical analysis, the atoms which comprise R_2O_3 are chemically bonded to the silica and are not affected by agitation in water.

Next evaluated in this study of the two sands was the quantity of silica bonded chemically to the other components of the substance causing the turbulence, and finally the quantities of free silica. It was curious that the silica contained in this cloudy fraction substance was for the most part free silica (about ⅘ and ¾ parts); in addition, with the two sands the ratio of free silica to clay was found to be approximately 2.5. The substance accordingly contains much more free silica than it does clay.

The above method thus does not permit determining the clay content of a sand, but indicates the quantity of colloidal material bonded to the sand, a substance which contains relatively little clay but principally silica, the major portion of which is free.

The mineralogical composition of a western Pennsylvania glass sand of a soft, friable nature, with an iron oxide content too high for a glass sand but which was considered suitable for beneficiating, was given by J. P. Poole[2] as follows:

Chemical analysis

SiO_2	98.75
Fe_2O_3	0.12
Al_2O_3	0.67
TiO_2	0.10
CaO	0.07
MgO	0.0
Na_2O	0.0
K_2O	0.09
Loss on ignition	0.37
	100.17

Screen analysis of the sand

Retained on	Percent
10 mesh	—
14 mesh	0.4
20 mesh	6.1
28 mesh	10.1
35 mesh	19.0
48 mesh	30.4
65 mesh	16.4
100 mesh	10.0
150 mesh	2.2
200 mesh	2.2
270 mesh	0.6
270 (passing)	2.6
	100.0

Petrographic examination of thin sections of specimens taken at the quarry showed that about 60 percent of the quartz was free and loose-grained; the remainder consisted of aggregates of quartzite, chert and iron-bearing minerals. The sand also contained about 1.5 percent of a ferruginous clay coating on the grains.

A typical heavy-media separation is shown in Table II, using a liquid of 2.71 sp. gr. Approximate calculations on the basis of the petrographic work showed an iron content (as Fe_2O_3) of about 0.11 percent which closely corresponded with the value obtained by chemical analysis. To produce a usable glass sand from this material, therefore, the Fe_2O_3 content had to be reduced from 0.12 percent to 0.025 percent or less. The TiO_2 content had to be reduced about the same amount. The remaining impurities did not need to be eliminated; they needed only to be made constant.

Rapid Tests for Melting Characteristics

Other things being equal, one of the most important properties of a glass sand is its melting properties. Short of large-scale tests in the actual production furnace, which take a long time, it is rather difficult to determine the melting characteristics of a sand.

The action of molten caustic soda has been proposed by M. A. Khatchvankian[4] as providing a quick test method for studying this property. The method was developed to obtain information regarding the conditions under which silicates are formed during the fusion of glass.

The test work first served to show that, whatever the proportion of Na_2O/SiO_2, the formation of sodium silicate (Na_2SiO_3) stops well before achieving the theoretical reaction:

$$2\ NaOH + SiO_2 = Na_2SiO_3 + H_2O$$

This arresting of the reaction is due to the formation around each grain of sand of a coating of solid silicate, effectively stopping the attack. The percentage of the transformation of silica into silicate for a given quantity of soda and for temperatures of 500-700 deg. C. clearly diminishes when the ratio Na_2O/SiO_2 diminishes, for example, from 1:1 to 1:5. Demonstrated by the test was (1) the reaction is almost independent of the size of the sand grains, at least for a normal size between 0.208 and 0.833 mm.; (2) the reaction is faster the higher the temperature; (3) it is always lower than its theoretical value and approaches this as the ratio Na_2O/SiO_2 diminishes, or in other words, as the excess of sand increases.

Experience has shown that all the grains of the sand are attacked and for ratios of the order of 1:3.7 and 1:4.5, in which the total grain surface area is the greater, the quantity of silicate formed almost corresponds to the total loss of soda.

The determination of the thickness of the sodium silicate protective coating formed on the grains is difficult; it would appear that it should be in the order of 0.08 mm.

In addition, to utilize all the soda and all the sand (reaction going to completion) in a 1:1 ratio, this is achieved either by taking sands so that the diameter of the grains does not exceed double the thickness of the coating of silicate, or else by adding bodies which form an easily fusible eutectic mixture with the Na_2SiO_3.

The speed of the melting reaction Na_2CO_3 + sand was determined to be much less than that of the reaction NaOH + sand, even when in the first case somewhat higher temperatures are used. Conclusions were that (1) the addition of caustic soda in the glass mixture should improve the melting and vitrification process; (2) a quantity of an accelerator, 2 to 3 percent of the total amount of glass formed, would permit the formation of a eutectic with a low fusion point, having as its effect the liquifaction of the silicate which is formed around the grains of silica. This would act as effectively with sodium carbonate as with caustic soda.

Glass Sand Beneficiation

The choice of a beneficiation method for glass sand will depend largely upon the nature of the sand itself, the distribution of the iron oxide and the mineralogical classification. Thus, no one treatment can be universally applied, but each sand deposit's characteristics must be carefully considered and a suitable process developed. Possible methods which can be applied are water washing, acid leaching, impact grinding and washing, flotation, magnetic separation and gravity separation.

Very considerable work has been done in Russia in recent years to improve available sand deposits for use in glass. The choice of methods is discussed by I. B. Schlain'. In the Russian standard specifications, it is specified that the iron oxide content should not exceed 0.1 percent for flat window glass and 0.05 percent for container glass. These standards make treatment of the glass sands necessary in the majority of cases. This is a subject which is becoming of increasing importance in Russia, as indeed it is in most other countries, for natural supplies of suitable glass sands are diminishing while glass output is increasing in all industrialized countries.

One of the first matters which has to be settled is whether the sand beneficiation plant should be located at the sand deposit or at the glass factory. The choice of the actual location of the sand plant will depend upon the amount of waste produced by the beneficiating process, the distance separating the deposit from the glass factory, the quality of the sand being treated and the organization of the work during the course of the year, i.e., according to whether there

Table II. Petrographic analysis of sink portion from heavy-media separation

Screen fraction (mesh)	Percent		Description
Plus 60 minus 30	45		Quartz grains coated with limonite
	45		Other minerals coated with limonite
	10		Discrete residue
Plus 120 minus 60	20		Discrete particles of limonite
	25		Discrete particles of leucoxene
	20		Discrete particles of tourmaline
	15		Discrete particles of mica
	5		Discrete particles of pyrite (oxidized)
	5		Discrete particles of zircon
	10		Grains coated with limonite
Plus 230 minus 120	20		Leucoxene coated with limonite
	15		Discrete particles of limonite
15		10	Oxidized pyrite
	10		Muscovite
10		20	Zircon
10		15	Tourmaline
20		10	Quartz covered with limonite
Minus 230	50		Zircon
	45		Unoxidized pyrite
	5		Tourmaline

is any shutdown in the quarry during cold winter weather.

The installation of the sand plant at the quarry can only be justified for the purification of argillaceous (clayey) sands, for obtaining sand of medium quality, and finally, when it is impossible for space reasons to locate the plant at the glass factory.

As a general rule for the manufacturer of window glass and of container glass to follow, however, the beneficiating plant should be located at the glass factory. The ultimate criterion of where the plant should be located will be relative costs.

Flotation Processes

The Russian work has been developed mainly along two classical methods of treatment—washing and flotation. Flotation installations for the beneficiation of glass sands have been studied by E. Z. Zitomirskala[4]. Discussing the fundamentals of flotation treatment, he points out that generally the iron oxides contained in a sand are distributed among the following groups of impurities: (1) various minerals existing as free grains enveloped in quartz grains; (2) particles of clay; (3) ferruginous minerals whose density is close to that of quartz.

They can also be present in the form of inclusions in the quartz grains or as coatings on hydrated iron oxides. The iron oxides are generally present in this way in a sand in various forms. In such cases, cleaning the sand involves a complex method having several successive processing operations. Beneficiation of the sand by means of flotation is recommended; the flowsheet shown in Fig. 1 illustrates the process.

This procedure has the following advantages: (1) possible elimination of several groups of impurities with a single treatment, and (2) a compact arrangement of the installation in a comparatively small area [for six flotation cells, this is a length of 7.07 meters (about 22 ft.), a width of 1.56 meters (about 6 ft.) and a height of 2.68 meters (about 8 ft.)].

The flotation plant has a high output—3 tons of moist sand per hr. Plant units can be used which are fairly simple to manufacture. A high quality sand is obtained.

In trial tests with the flotation plant, where the initial sand contained 0.11-0.17 percent iron oxides, it was possible to reduce this to 0.03-0.05 percent, which represents a beneficiation of 64-76 percent. The product obtained in this way had a purity of 97-98 percent.

Flotation Plant Studies

As already mentioned, much work has already been done in Russia on glass sand beneficiation processes; over a hundred research projects have been conducted. Sand flotation

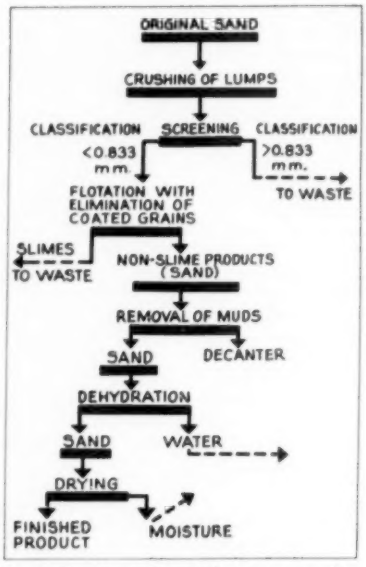

Fig. 1: Flowsheet of sand flotation upgrading treatment

treatments and flotation plants have been studied in detail by I. B. Schlein, V. A. Meitina, Ia V. Timochkof and R. I. Moness[5].

Studies have extended over the last 20 years. The result of this work has been the development of a series of technical methods using concentration equipment, magnetic separators and various washing installations.

Beneficiation is considered difficult when yellow sand grains are covered with a coating of iron hydroxide, for which the methods applicable to white sands are not suitable. Such sands constitute more than 95 percent of the glass sand deposits in Russia.

One of the drawbacks of most current industrial methods of sand beneficiation is the excessive loss of sand which occurs as a result of the treatment. However, during 1948-1950, a new flotation method was developed at the Moscow glass institute. This was applied to sands originating from more than 20 different deposits to test the effectiveness and the flexibility of the process to different sands.

The chemical composition of the test samples studied was somewhat variable; considering only the essential components, the limits were:

SiO_2 : 83.13-99.42 percent; Al_2O_3 : 0.22-11.24 percent; Fe_2O_3 : 0.04-0.57 percent; CaO : 0.05-1.20 percent; MgO : traces to 0.72 percent; Na_2O : 0.09-3.66 percent.

Gradation of the sands was: fine grains of 0.12-0.20 mm.; average grains of 0.15-0.30 mm.; and coarse grains 0.20-0.60 mm.; the total content of these was above 80 percent of the weight of the sand.

The method of beneficiation by attrition flotation is based on (1) the difference between the surface properties of the quartz and the foreign minerals, which causes most of the foreign matter to float while the quartz sinks and remains agglomerated; (2) the difference between the hardness of the iron oxide coating and that of the quartz which gives an average effect, so that by the reciprocal attrition agitation of the sand particles, the oxide coating is removed and there is no excessive "milling" down of the quartz grains; (3) the difference in the sedimentation rates of the bulk of the sand and the fines (minus 70μ) by means of which, after having passed the sand into suspension, one can eliminate the clayey particles and the finer impurities.

This method comprises three operations: flotation, elimination of the oxide coating and washing. Tests led these workers to classify the sands according to their purification characteristics and their chemical and mineralogical characteristics. This classification was divided into two groups:

Group A. Sands in which at least 10 percent of the iron oxides are coatings.

Group B. Sands in which the iron oxide coatings are less than 10 percent of the total iron oxides.

The beneficiation processes were established as a function of these classifications. There are five possible processes: (1) flotation with attrition, after preliminary washing for the argillo-feldspathic sands of Group A; (2) flotation with attrition for feldspathic or non-feldspathic sands of Group A; (3) flotation for the non-feldspathic sands of Group B; (4) flotation with preliminary attrition for the glauconitic sands (green sands—hydrated silicate of iron and of potassium); (5) flotation with preliminary washing for the argillo-feldspathic sands of Group B.

In Fig. 2 is shown a flowsheet of the successive operations in an installation for beneficiation by flotation with attrition cleaning.

The sand silo (1) has a screen (2) to retain sand greater than 75-80 mm. The preparation section for treating the sand is comprised of a silo (3) of 1-1.5 cu. m. capacity, a screw conveyor (4) for continuous, uniform feed of the sand, and a sand washer. The feed rate of this equipment at the Russian Koliokof Station can be varied from 8 to 300 t.p.h. Screening is done by any type of vibrating screen (5), if possible one having two decks. The flotation cells (6) are either the mechanical or the rotary type; the sand, in being displaced from one cell to the other, is subjected to the action of the reagents and to the attrition. The refined sand leaves by a pipe at the discharge pocket of the unit.

Desliming is done in a sedimentation apparatus (7); the sand leaves this unit continuously with a water content of 20 to 25 percent, and the

slimes pass through a screen to waste. Dehydration of the sand is accomplished in centrifugal dryers (8), where the moisture is reduced to 2-3 percent.

The employment of the flotation reagents requires having a mixer (9) for the preparation, a centrifugal pump (10) for handling, a storage tank (11) and a two-compartment feed measuring tank. A processing installation of average size can be characterized by the following data:

1. Yield of sand	92 percent
2. Consumption of sulfonated flotation reagents	1 kg./ton
3. Consumption of commercial sodium carbonate	3-4 kg./ton
4. Consumption of water	4-5 cu. m./ton
5. Consumption of electric power	12-21 kw.-hr./ton
6. Cost of beneficiation	13-17 Russian rubles/ton

An installation based on these principles was put into operation at the Russian Autosteklo factory in May, 1950 (flotation system with attrition for Group A sands).

The production of one beneficiation machine is 80 tons per 24 hr. on the average; operation requires five men and water consumption is 5 cu. m. per ton.

Analysis showed that the proportion of Fe_2O_3 in the purified sand had been reduced from 0.04-0.07 percent to 0.035-0.04 percent. At the experimental sand plant of the Moscow Institute, water consumption had been about 5 cu. m. per ton of sand. Power demand was 30 kw. and the hourly production was 3 tons. Analysis of the purified sands showed that the Fe_2O_3 proportion, which before beneficiation was 0.03 to 0.15 percent, had been reduced to 0.02-0.04 percent.

This method of sand purification has the following advantages and disadvantages. Advantages are: high output, simplicity of operation and control, small amount of labor required, low operating costs. Disadvantages are: fairly high power consumption, high water consumption, sensitivity to variation in the quality and temperature of the water.

The appreciable quantity of power required to operate the plant and the necessity of heating the water makes it more suitable to install the purification unit at the glass factory rather than at the sand plant. Vertical arrangement of equipment is most efficient, for maximum use can then be made of gravity handling.

Choice of Method

The decision as to whether a simple washing or the more elaborate flotation treatment should be adopted has been considered by I. B. Chlaine[10].

In a comparison of the merits of the two processes, it is sufficient to consider the greater improvement in the quality of the glass sand which permits obtaining greater homogeneity by the flotation treatment. A reduction in the waste loss of nearly 20 percent is also realized when the flotation process is employed; loss amounts to 25-30 percent with the washing process and only 5 percent with the flotation process. Processing costs with the flotation method are less but installation costs are 15 to 20 percent greater.

Washing can be employed when the iron oxide content of the sand is low or it meets specifications, if the sand is sufficiently homogeneous, if the quantity of heavy minerals is insignificant (if their character and dimensions permit rejecting only the finer fractions of silica, of small amount in a given sand).

In order that waste losses in washing shall be the lowest possible, the iron oxides should be in the same size fraction as the fine sand. This means the grains which are most easily removed by the water. The characteristics are those of argillaceous sands without an oxide coating.

Sand purification by washing can find an extensive application (a) if the purification installations are erected at the sand plant; (b) when the waste losses are not great; (c) when the upgrading of the raw materials is being conducted by concerns with a relatively small production and strictly limited resources.

Flotation treatment is suitable for sands having the following characteristics:

(a) Content of iron oxides in the most important part of the sand, which is higher than the standard specified;

(b) A fairly high content of heavy minerals, particularly if their dimensions are the same as the silica grains;

(c) If the sand has a sand particle size distribution which would cause considerable loss by other methods of treatment because of the necessity of eliminating grains which are too fine and too numerous;

(d) High quality white sand for which purification methods by dry methods result in too high losses;

(e) Sands which are non-homogeneous, both chemically and physically.

The flotation procedure is particularly interesting for installations where waste losses must be reduced to a minimum or where the output volume is important.

Various other methods can be used for treating glass sands; some are in commercial operation for particular sand deposits, but most fall down as a general treatment method. Acid leaching is in use at some plants. Its effectiveness, however, will depend on the nature and distribution of the iron oxide in the sand. An acid leach can remove the limonite coating on the grains of silica and dissolve out any iron present in the argillaceous fines, but it cannot remove the heavy minerals containing iron or the iron in these minerals. It also has no effect on the iron fraction held inside the quartz grains.

Flotation has already been discussed in detail above. Poole has tried flotation treatment on a Pennsylvania sandstone without satisfactory results. This is because flotation can only remove the discrete particles of iron and titanium-bearing minerals and the stained particles that are nearly or completely covered with

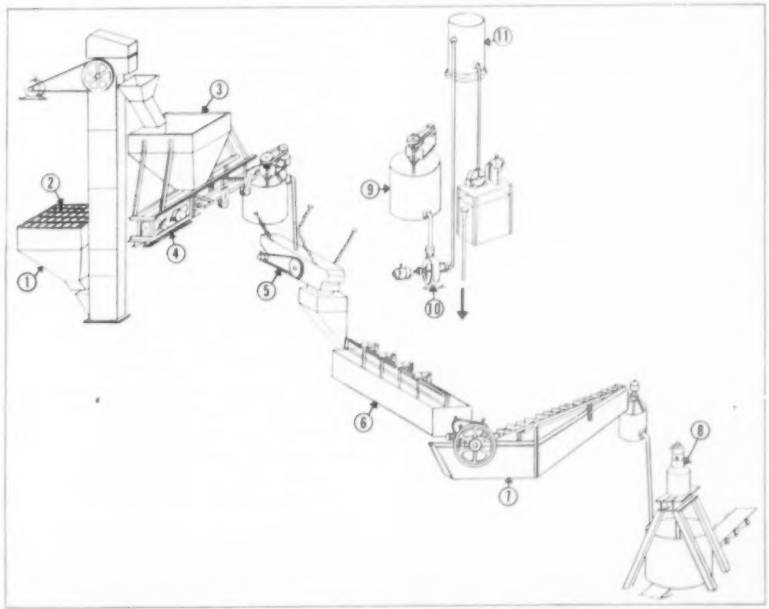

Fig. 2: Diagrammatic flowsheet and layout of equipment for flotation treatment with "attrition" cleaning. The flotation reagent section of the operation is pictured at top center. (Numbered identification referred to in text.)

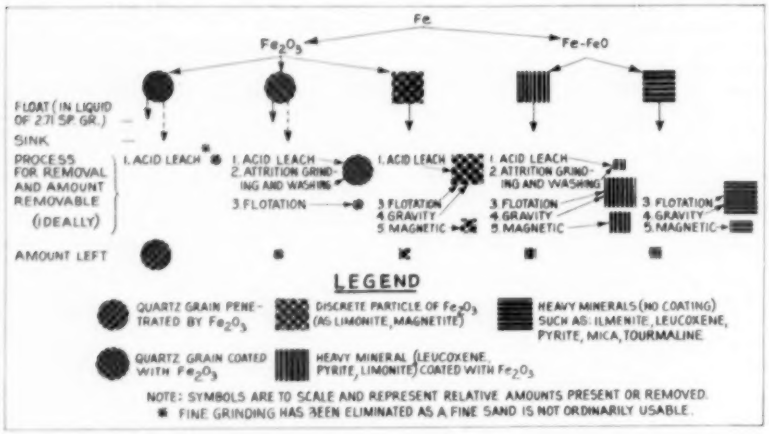
Fe
Fe_2O_3
Fe-FeO
FLOAT (IN LIQUID OF 2.71 SP. GR.)
SINK
PROCESS FOR REMOVAL AND AMOUNT REMOVABLE (IDEALLY)
1. ACID LEACH
1. ACID LEACH
2. ATTRITION GRINDING AND WASHING
3 FLOTATION
1. ACID LEACH
3 FLOTATION
4 GRAVITY
5 MAGNETIC
1. ACID LEACH
2 ATTRITION GRINDING AND WASHING
3 FLOTATION
4 GRAVITY
5 MAGNETIC
3 FLOTATION
4 GRAVITY
5 MAGNETIC
AMOUNT LEFT
LEGEND
QUARTZ GRAIN PENETRATED BY Fe_2O_3
DISCRETE PARTICLE OF Fe_2O_3 (AS LIMONITE, MAGNETITE)
HEAVY MINERALS (NO COATING) SUCH AS: ILMENITE, LEUCOXENE, PYRITE, MICA, TOURMALINE
QUARTZ GRAIN COATED WITH Fe_2O_3
HEAVY MINERAL (LEUCOXENE, PYRITE, LIMONITE) COATED WITH Fe_2O_3
NOTE: SYMBOLS ARE TO SCALE AND REPRESENT RELATIVE AMOUNTS PRESENT OR REMOVED.
* FINE GRINDING HAS BEEN ELIMINATED AS A FINE SAND IS NOT ORDINARILY USABLE.

Fig. 3: Representation by J. P. Poole of the five forms in which iron was found in the Falls Creek sand, the methods tested for removal of each type, and the approximate efficiency of each operation

the limonite stain. The lowest iron assay obtained by flotation was 0.039 percent in this case, as against 0.12 percent originally. Most of the iron remaining was present as a limonite stain that deeply penetrated the surface of the sand grains. As this stain did not cover a major portion of the grain, flotation could not be used to remove it.

Iron Oxide Distribution Study

As has been pointed out previously, development of a suitable beneficiation treatment for glass sands requires a study of the iron oxide distribution in the sand. An interesting example of how this study is conducted is provided in the following (by J. P. Poole[2]). This concerns western Pennsylvania sandstone, the chemical and mineralogical composition of which has been given. To develop a suitable upgrading treatment, study was made of the iron distribution. The iron was found distributed in five different forms in this sand. The diagram in Fig. 3 shows the methods tested for the removal of each type and the approximate efficiency of each operation. The bulk of the iron remaining in the sand after these upgrading processes was retained inside the quartz grain and was almost impossible to remove.

Attrition Grinding

After trying out various methods, it was found that the most satisfactory treatment was attrition grinding in a large pebble mill under conditions that should have given the fastest and most efficient size reduction. It was found that the sand had to be reduced in size by attrition grinding rather than by uncontrolled impact grinding. The tests showed that attrition grinding resulting in a product of 95 percent 150 mesh is the most economical and dependable of the processes tried. The process is successful only when size reduction is the result of attrition. The attrition grind serves to remove the limonite stain on the quartz grains by actually rubbing away the surface of the particle. The stained portion is thus reduced to a slime that is removed later by washing and classifying. The only drawback to the process is that the product is considerably finer than 50 mesh.

Pilot plant studies run with the cooperation of Allis-Chalmers Manufacturing Co. on several hundred pound quantities showed that the process gave a satisfactory product.

A flowsheet of the proposed large-scale beneficiation plant that would produce 300 tons of plus 400-mesh minus 150-mesh sand a day with a total iron content not exceeding 0.025 percent is shown in Fig. 4. A jaw crusher and gyratory crusher are used in the primary crushing. The product from the gyratory is reduced further in a rod mill to minus 10 mesh. The minus 10-mesh material passes through a wet magnetic separator to the tube mills for attrition grinding to minus 150 mesh. The tube mills are in closed circuit with a bowl classifier. The minus 150-mesh sand is sent from the classifier to a hydroseparator where the minus 400-mesh slimes are removed. The material then passes successively to a thickener, a filter and a dryer. The water content of the product is less than 1 percent. The plant is estimated to operate at about 80 percent efficiency. A detailed study of cost estimates showed that this plant can produce 300 t.p.d. of upgraded sand at the pit for about $2 per ton on the basis of a 10-year depreciation figure for the plant.

It will be seen that the processing is considerably more involved than the Russian processes described, and also there is the serious technical drawback that an excessively fine sand is produced. It may be that the Russian sands are more amenable to the upgrading treatment and that this western Pennsylvania sandstone is a difficult sand to treat. This being so, the question which demands serious consideration is whether a difficult sand of this nature can be suitably processed, in view of the intensive treatment required, the relatively high installation cost of the treatment plant, the complicated nature of the plant, the somewhat intensive grinding required and the final production of an excessively fine sand. Poole has stated that this fine sand has been successively melted in a glass furnace; nevertheless the fact remains that very fine sands are not desirable for glass melting purposes owing to dustiness in the furnace atmosphere. Almost the entire melting effect in a glass furnace is obtained by radiation; a "fog" in the furnace atmosphere caused by the use of an excessively fine sand would obviously considerably reduce the radiation and consequently the heat transfer effect and the over-all melting efficiency and melting rate.

Drying of Glass Sands

Both natural and processed glass sands will need to be dried, which is a general practice. Strict control of the glass composition for working on automatic machines makes drying a necessity. Some sand producers dry at the pit but most glass companies usually dry the material at the factory.

Various processes for drying the sand are:

1. *Draining.* Sand having initial moisture content of 10-15 percent is spread over permeable support floors which constitute the draining surface; in 24-48 hr., the content can be reduced to 5 percent.

2. *Filtration.* Vacuum filters are employed; equipment of this type can treat 10-12 tons of sand per hour and the moisture can be reduced to 8 percent.

3. *Centrifuging.* Moisture content can be reduced to 1 percent by this method. In view of the abrasive nature of the sand being processed, and the necessity of avoiding iron contamination, it may be necessary to use stainless steel construction with an internal lining of rubber.

4. *Rotary dryer.* For final drying, the rotary dryer is commonly employed. A typical unit consists of two inclined concentric cylinders, about 30 ft. in length. The interior cylinder will have a diameter of about 2 ft. and the external cylinder about 6 ft. The hot combustion gases from the flame first pass through the internal cylinder (temperature drops down to about 450 deg. C.) and the gases then pass through the annular space between the two cylinders and leave the dryer at a temperature of about 52 deg. C.

An elevator carries the sand to

the lower part of the dryer and feeds it into the annular space between the two cylinders. A helicoidal ramp placed along the internal wall of the external cylinder carries the sand along the dryer to the top, from where it falls along the external wall of the inside cylinder. In this way, the moist sand is simultaneously dried and heated by contact with the internal cylinder and by the action of the warm air traveling counter-current through the annular space. At the exit from the dryer, sand has a temperature of 75 or 100 deg. C.

The output of a dryer of this type will be around 12 tons of dry sand per hr. The thermal efficiency (ratio of the heat utilized for expelling the moisture to the total heat furnished) is around 40 percent. The power required for operating a rotary dryer is 15 hp. for rotation of the cylinder, 10 hp. for the venting fan for the hot gases, 5 hp. for the elevator drive for the moist sand, and 5 hp. for the elevator drive for the dry sand.

Maintenance costs for the dryer are fairly high; the helicoidal ramps particularly wear greatly; iron contamination of the sand in the dryer is negligible.

Controlled Humidification of Glass Sands

Some recent technical developments in Russia have been in controlling humidification of the melting mixture. It is known that humidification results principally in the maintenance of the desired homogeneity in the glass, a reduction in the formation of dusts and in losses and contamination resulting from their entrainment in the furnace atmosphere, and finally, melting is more rapid.

This last effect is due to the fact that each grain of moist sand is enveloped by a film of water in which the particles of sodium carbonate are able to dissolve; the grain of sand is finally enveloped with a fine coating of a solution of sodium carbonate and the fusion is accelerated by the formation of caustic soda according to the reaction $Na_2CO_3 + H_2O = 2NaOH + CO_2$. In the case of a sodium sulfate mixture there is the formation of Na_2S which gives (with $2H_2O$) $2NaOH + H_2S$. In addition, it will be seen that with a mixture of sulfate, twice as much water is necessary as with a sodium carbonate batch mixture.

The next question to consider is when and to what extent humidification should be effected. It would be an error to moisten the raw materials during their mixing because agglomeration would then result and the moistening would not be uniform throughout. The best procedure is to moisten only the sand before the batch mixing operation for the raw materials. This is fully discussed by S. Ia. Raf[11]. It is also important that the sand should be impregnated with the added moisture as uniformly and as rapidly as possible. To achieve this, water is fed to the sand by a pipe leading from a reservoir so as to give a constant pressure head. Feed of the water is arranged in proportion to the sand feed.

The moisture content in the batch melting mixture itself should be 2-3 percent with a carbonate mixture; 3-5 percent with a sulfate-carbonate mixture, and 6-7 percent with a sulfate mixture.

The quantity of water to be added to the sand can be calculated from the above figures, according to the proportion of sand used in the batch mixture. The sand should not be of a higher temperature than 35 or 40 deg. C., otherwise agglomeration of

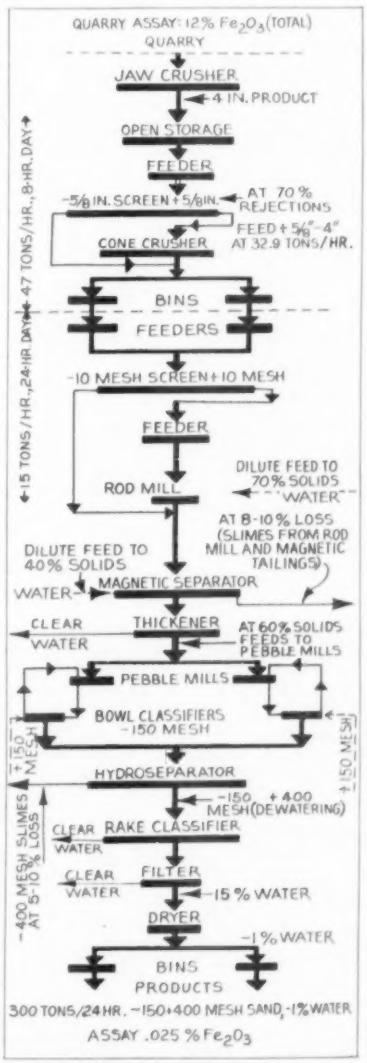

Fig. 4: Flowsheet of proposed (by J. P. Poole) beneficiation plant capable of producing 300 tons of plus 400-mesh minus 150-mesh sand per day with a total iron content not exceeding 0.025 percent

the sand particles will result which will undo the effect of the humidification.

The question may well be asked what is the apparent good of first drying the sand if it is subsequently going to be moistened again. The reply is clear. The preliminary drying of a sand which has a moisture content higher than 2-3 percent is indispensible for screening, which is necessary to obtain a fixed gradation. On the other hand, a moist sand is not generally uniformly moist; for example, stockpiles at the quarry or in railroad cars can be rained on and the upper layer will be wettest. This non-uniformity is undesirable.

Moistening by steam, which is sometimes done while the batch mixture is being fed into the furnace, is not to be recommended. Reasons: first, because it is done too late (after the mixing operation) and second, because as the steam strikes the broken glass cullet in the mixture, it cannot penetrate uniformly into the powdered mixture.

Dust Hazards and Silicosis

Glass sands are fairly fine grained. Dust hazards and risk of silicosis result when handling these fine materials or else the powdery glass batch mixture in which the sand is incorporated.

The safest, cheapest and most convenient means of handling sands in bulk is by means of pneumatic conveyors. Plants using these can handle large quantities of materials practically dust-free. In this way, dust hazards are avoided and the same plant can also be used for handling the other constituents of the glass batch mixture.

Where dust is present in the atmospheres of the storage rooms and mixing stations, the question of a hazard then arises and means must be taken to combat it. Dust present in air around glass mixture handling and mixing plants has been discussed by A. S. Serenko[12]. It is well known that the moistening of the solid raw materials used in the mixture considerably diminishes the formation of dusts; no systematic study has hitherto been made of the influence of the degree of moisture present on the dust formation. Serenko shows how dust can be kept down by controlled humidification.

A further means of countering dust hazards with these materials is by the use of respirators. Dusts can be divided into two broad groups according to their harmful effects on the human body. These are: (a) small dust grains each particle of which has a diameter less than 10μ; (b) coarse dusts, whose particle diameter is greater than 10μ. The coarse dusts are deposited on the wall linings of the nose, the throat or the bronchial tubes and do not reach the lungs.

(Continued on page 112)

Wet Process Plant in El Salvador

Central American cement plant uses marine shell and volcanic pumice and sand as raw materials

By CLYDE A. MOSER*

EL SALVADOR'S DREAM of establishing a cement plant within its borders has finally been realized with the organization of a private company known as Cemento de El Salvador, S.A., and the construction of an 1800-bbl. daily capacity plant located at Playa Las Flores, Acajutla, El Salvador, Central America.

A contract was entered into with Allis-Chalmers Manufacturing Co. to furnish all of the cement making machinery and equipment. Macdonald Engineering Co. was given the contract to construct the plant and erect the machinery and equipment.

Raw Materials

Basic materials consist of marine shell having a calcium carbonate content averaging 84 percent and a volcanic formation of pumice and sand analyzing 68 percent silica and 15 percent alumina.

The marine shell life originates at several large coral reefs located about two miles off the coast. The shells are carried over and through many volcanic rock formations, by action of the Pacific Ocean, before they reach the shore line. When the shell material finally reaches the beaches it has been broken and ground naturally so that 100 percent passes a ⅜-in. screen and 99.5 percent passes a 4-mesh screen. Thus, no primary or secondary crushing is necessary.

The shell material taken from the beaches and coves is handled by a 1½-cu. yd. diesel-driven P&H clamshell which deposits the material into a traveling hopper mounted on railroad rails and equipped with a self-contained belt feeder for regulating the discharge. The hopper and belt feeder are located directly over a portable 24-in. x 200-ft. belt conveyor driven by a 7½-hp. gearmotor. This belt conveyor discharges the material onto a 24-in. x 660-ft. inclined belt conveyor driven by a 30-hp. gearmotor and which is set at right angles to the 200-ft. conveyor. The longer conveyor discharges onto a 24-in. x 150-ft. belt conveyor driven by a 7½-hp. gearmotor. This conveyor is equipped with a tripper to distribute the shell material into and along the raw storage building and also into the mill feed bins. All the belt conveyors, feeders and trippers in this section are Jeffrey.

The volcanic pumice and sand is located at Las Tres Ceibas, about 44 miles from the plant site and adjacent to the El Salvador railroad. This material is loaded on railroad cars with a ¾-cu. yd. Bucyrus-Erie 22-B diesel shovel. The loaded cars are transported by railroad to the plant site where the material is unloaded into a steel hopper, and from there conveyed to the clay storage bin by a 24-in. x 15-ft. Barber-Greene belt conveyor driven by a 3-hp. motor. The pumice and sand can also be unloaded into a track hopper which feeds an Allis-Chalmers No. 3 Pulverator driven by a 50-hp. motor. The crushed material is then taken to the clay storage by a 12-in. x 36-ft. Jeffrey bucket elevator driven by a 3-hp. gearmotor. Primarily the crusher and elevator are used for crushing and handling incoming gypsum. The elevator is, however, equipped with a double discharge chute for discharging material either into the gypsum or clay storage bins.

Gypsum deposits have been located in El Salvador, but present indications are that deposits do not contain sufficient gypsum to meet requirements. Initial supply will probably be purchased from outside sources.

Raw Storage

The raw material storage building is 72 ft. wide and 320 ft. long and is designed to store 7875 tons of shell material, 3800 tons of clay, 2000 tons of gypsum and 83,000 bbl. of clinker. The building is constructed of reinforced concrete and structural steel. Due to very heavy rains during the six month rainy season, the building is fully enclosed, except the part which houses the shell material.

The crane runway is equipped with a P&H 6½-ton capacity electrically operated traveling crane having a 2½-cu. yd. clamshell bucket. This crane distributes material and places the various materials into the mill feed bins which are located in the storage building adjacent to the grinding departments.

Raw Grinding

An A-C 9- x 13-ft. Preliminator is fed by two 24-in. x 8-ft. proportioning feeders, one feeding shell material and the other feeding pumice and sand. An extra feed bin is provided for storage of high siliceous materials which

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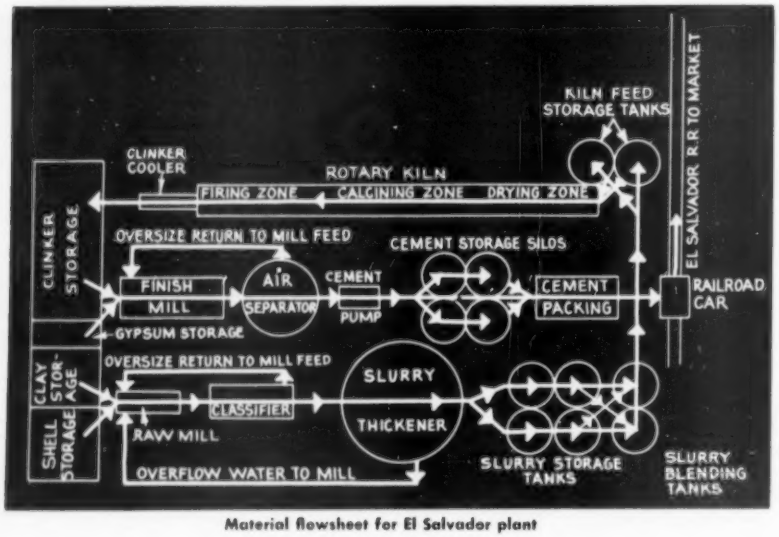
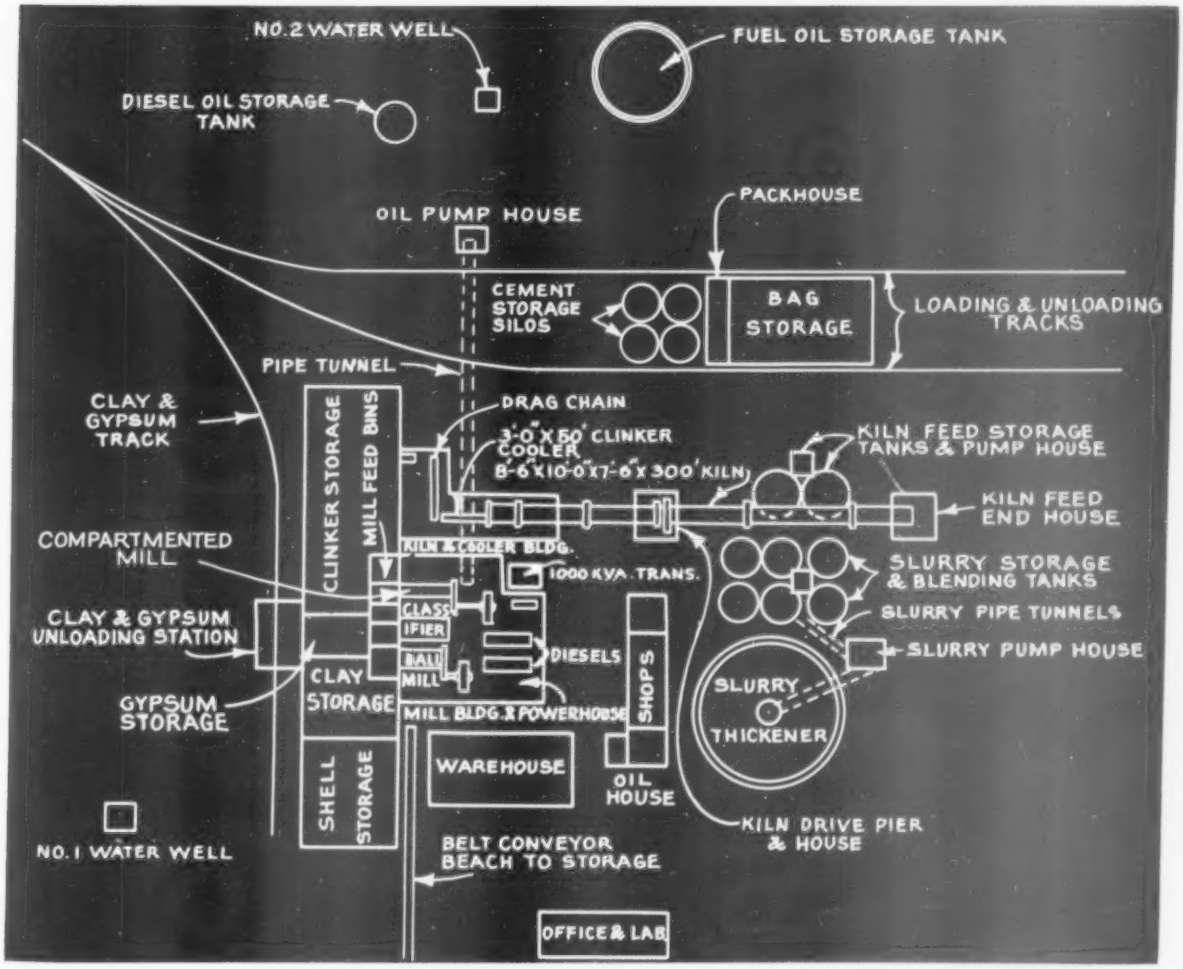


Material flowsheet for El Salvador plant



General layout of plant

can be used for quick correction of the slurry composition if so desired.

The Preliminator is driven by a 500-hp. synchronous motor, connected to a countershaft equipped with a Falk flexible coupling and a magnetic clutch. Sealed oil ring bearings are used. The main trunnions are equipped with a high pressure lubricating system to facilitate easy starting of the Preliminator.

The Preliminator operates in closed circuit with a 12- x 36-ft. Dorr classifier. Oversize material is returned to the mill feed. An Allis-Chalmers 6- x 8-in. slurry pump conveys the classified material to a 100- x 16-ft. Dorr thickener. The overflow water is returned to the Preliminator and classifier by a similar slurry pump.

The thickened slurry is drawn from the thickener by gravity and a Dorrco diaphragm pump, which discharges into a sump. A 3-in. Wilfley centrifugal sand pump transports and distributes the slurry to either one of four 22-ft. dia. x 20-ft. high concrete slurry tanks. Two 5-in. Wilfley centrifugal sand pumps are used for recirculating the slurry in the slurry storage tanks, pumping to two 22-ft. dia. x 20-ft. high slurry blending tanks or to two 28-ft. dia. x 15-ft. high concrete kiln feed storage tanks.

The slurry storage and blending tanks are equipped with propeller-type mechanical agitators. Supplemental air agitation is also provided. The kiln feed storage tanks are equipped with Minogue mechanical and air agitators. A 229-c.f.m. Chicago Pneumatic air compressor provides air for slurry agitation. All valves used in the slurry lines are of the lubricated plug type.

A 3-in. Wilfley centrifugal sand pump transports the slurry from the kiln feed storage tanks to an Allis-Chalmers ferris wheel feeder. Overflow returns by gravity to the kiln feed tanks. Spare pumps have been installed at each of the stations.

Kiln Firing

An A-C 8-ft. 6-in. x 10-ft. x 7-ft. 6-in. x 300-ft. rotary kiln, having a capacity of 900 bbl. daily, is part of the initial installation. The kiln is equipped with a chain system 56 ft. long.

The kiln has five supports and is driven by a 50/60 hp., 500/1500 r.p.m. d-c motor through a Jones herringbone gear speed reducer. A Falk flexible coupling is mounted on the slow speed shaft between the speed reducer and the kiln drive pinion. Nose ring castings are the Allis-Chalmers air-cooled type. Cooling air is furnished by the cooler fan.

The ferris wheel feeder is driven by a variable speed d-c motor, synchronized with the kiln speed. Amount of feed is regulated by a mechanically operated Vari-Pitch speed changer. Kiln draft is provided by a high temperature Sturtevant No. 90 induced draft fan equipped with a 30-ft. 6-in. dia. x 31-ft. 11-in. steel stack. The kiln feed end is also equipped with a hopper-type dust collector.

Bunker C fuel oil is used for kiln firing. This oil is supplied from 83,000-bbl. capacity storage tanks located at Acajutla, about 2 miles from the plant site. The fuel oil is brought to the plant site in railroad tank cars

and unloaded into a 550,000-gal. storage tank at the plant.

Clinker Cooling

The clinker upon leaving the kiln passes over a 3- x 50-ft. air quenching cooler driven by a 7½-hp. motor. The fan which provides air for cooling the clinker is driven by a 30-hp. motor with Texrope drive. Another fan provides primary and secondary air for combustion. All fans are Sturtevant.

Upon leaving the cooler, clinker can be handled by two different methods: spouted directly over the clinker storage wall or by a Jeffrey 16-in. x 52-ft. drag chain conveyor. The drag chain discharges directly into an A-C type "R" clinker crusher, driven by a 25-hp. motor at 1800 r.p.m. The crushed clinker goes to either of two Jeffrey 42-ft. 6-in. bucket elevators which in turn discharge directly over the clinker storage wall or the elevator can discharge upon a 24-in. x 100-ft. belt conveyor equipped with a Weightometer to check kiln production. This belt conveyor discharges either into the mill feed bins or into the clinker storage.

Finish Grinding

Two 24-in. x 8-ft. proportioning feeders deliver clinker and gypsum to an A-C 8- x 29-ft. Compeb mill driven by an 800-hp., 180-r.p.m. synchronous motor connected to a countershaft equipped with a Falk flexible coupling and magnetic clutch. Like the Preliminator, all countershaft bearings are of the sealed oil ring type and the Compeb mill main trunnions are equipped with a high pressure lubricating system to facilitate easy starting.

A 16-ft. Sturtevant air separator is used in connection with the Compeb mill for closed circuit grinding. The separator is driven by a 100-hp. motor through a Texrope drive.

Finish grinding machinery and cement handling equipment are vented by means of a Sly dust collector.

A 74-ft. 4-in. bucket elevator transports the cement from the Compeb mill to the air separator. Finished cement from the air separator or Compeb mill discharge flows by gravity into a Fuller-Kinyon cement pump which transports the cement through a 5-in. pipeline to either one of four 26- x 80-ft. concrete storage silos or to an interstice bin.

Packing

Cement is drawn from the conical hopper bottoms of the silos by Fuller-Huron Airslides which discharge into either one of two 16-in. x 43-ft. 4-in. Jeffrey screw conveyors. A cross screw conveyor 16-in. x 29-ft. carries the cement to a 49-ft. 2½-in. bucket elevator which discharges into a 24-in. x 12-ft. spiral screening conveyor located directly over the packer feed bin. The bucket elevators were made by Jeffrey.

Packing is done on a St. Regis 4-tube packing machine. The feed bin is equipped with a surge bin and bin feeder. The bin is also equipped with a Fuller bin level indicator.

A 30-in. wide reversible belt conveyor takes the bagged cement to loading aprons on either side of the packhouse; from there the bags are hand trucked into railroad cars. Two of the storage silos are equipped with outside chutes for loading of bulk cement.

Power

Power for plant operation is supplied by two 720-hp. General Motors diesel engines, each driving a 500-kw. Allis-Chalmers generator delivering 440-volt current. Additional power is also purchased from a local power company. Diesel oil will be delivered to the plant site by either truck or railroad and stored in a steel tank having a capacity of 110,000 gal.

The cement company erected a 34.5-kv. power transmission line from the plant site to a source of power supply, a distance of approximately 20 miles. Concrete poles, 40 and 65 ft. high, manufactured by Cemento de El Salvador, were used through the level part of the country and 45-ft. high wood poles through the mountainous section.

An Allis-Chalmers 1000 kv.-a. transformer will reduce the 34,500 volt purchased power to 440 volts as required by the plant. A 100-kw., 230-volt motor generator set will provide d-c current for variable speed motors and the synchronous tie. An A-C rotary air compressor driven by a 60-hp., 12,000-r.p.m. motor will furnish air for the cement transport system. A 659-c.f.m. Chicago Pneumatic air compressor driven by a 125-hp., 900-r.p.m. motor will furnish 100 p.s.i. air for general plant use.

Auxiliary Buildings

Auxiliary buildings include a 50- x 100-ft. general warehouse, with storage for 500,000 paper bags; a machine shop equipped to handle all normal repair work; maintenance and electrical repair shop; change house for employes; office; laboratory; first aid station; two water pump houses and an oil pump house.

The company has also constructed 22 houses at the plant site as living quarters for plant administrators, supervisory staff and key operating personnel. A mess hall with kitchen was also built to provide meals for the employes.

Water for the plant is obtained from two 10-ft. dia. x 200-ft. deep wells. Each of these wells is equipped with a 350-g.p.m. Layne-Bowler deep well turbine pump. Two A-C 350-g.p.m. centrifugal booster pumps elevate the water to a 100,000-gal. storage tank located above the cement storage silos.

Before starting construction the company installed a crushing and screening plant in order to produce all stone required as concrete aggregate. Beach sand was also available on the company's property.

The cement plant is served by a branch line of the El Salvador railroad which connects with the International Railroad of Central America. The company also improved a road from the plant site which connects with the main highway from Acajutla to Sonsonate and further on with the Pan American Highway. The plant is located about 2 miles from the port of Acajutla, which provides excellent facilities for export trade.

Personnel

Officers and operating executives include Jamie D. Hill, president; Tomas Regalado, director; Antonio Belismelis, director; Archie Baldocchi, director; Roberto Quinonez, director; Jose Antonio Rivera, legal advisor; H. W. Smith, general administrator; Clyde A. Moser, general superintendent; and Edward Chang, chief chemist.

Static Electricity

THE NATIONAL BUREAU OF STANDARDS, which for many years has been consulted by other government agencies on problems arising from hazards associated with static electricity, is presently enlarging its research and standardization program to meet the growing demand for this information.

Under the direction of F. L. Hermach, the bureau is setting up a program for establishing and evaluating methods of measurement and for determining the properties of materials and equipment used to reduce hazards from static electricity.

The results of one phase of the program, an investigation of the conductivity of floor coverings, are already being utilized to reduce static electricity hazards in federal munitions plants and in hospitals.

In addition to the consultatory and testing services to other government agencies, members of the N.B.S. staff have also served on a number of committees that have been organized to formulate rules and procedures governing static electricity preventive practices.

In 1942, the bureau published a circular (N.B.S. Circular 438, "Static Electricity") that outlines the problems and suggests solutions which are considered just as applicable today as when written. The circular discusses the nature and the origin of the charges of static electricity arising in industrial processes, and explains the various methods of mitigating the hazards that they introduce. Copies of the circular are still available from the Superintendent of Documents, Washington 25, D.C., at $.10 each.

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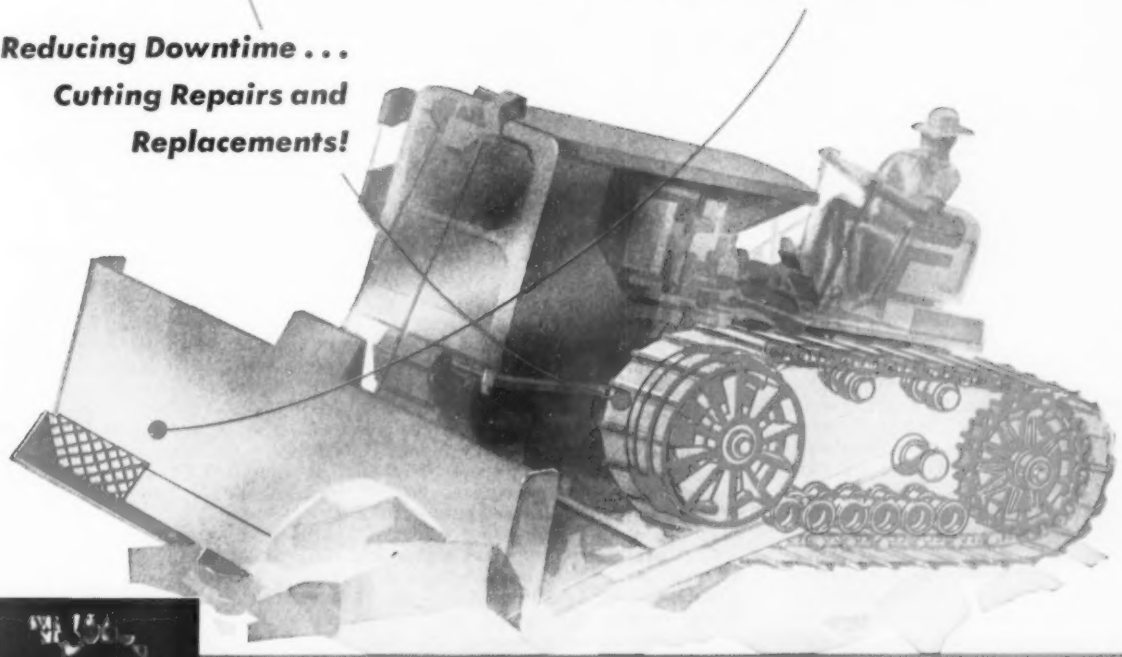
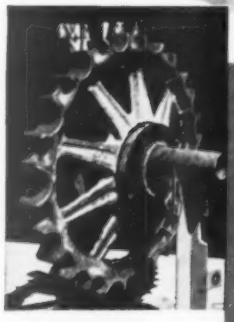
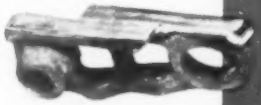
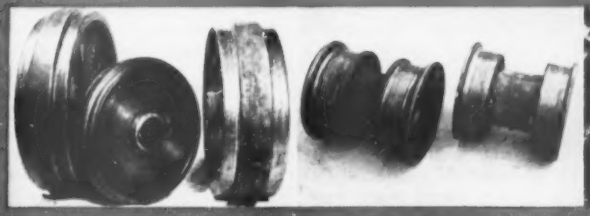




TRACTOR DRIVE SPROCKETS—rebuild and hard-face manually with Stoody Self-Hardening or Stoody 1027 to original size . . . rough grind high spots only . . . *gives service equal to new parts.*

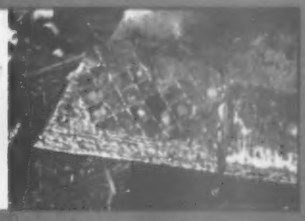


TRACTOR RAIL LINK—hard-faced with Stoody 104, applied automatically. *Service life equal to new.*



TRACTOR IDLERS—rebuild and hard-face on automatic welding machine, using Stoody 105 . . . *service equals or exceeds new parts.*

TRACTOR ROLLERS—rebuild and hard-face on automatic welding machine with Stoody 105, *service equals or exceeds new parts.*



BULLDOZER END PLATES—hard-face manually with Stoody Self-Hardening 21 . . . apply cross-hatch or stringer beads, *service life increased 3 or more times.*

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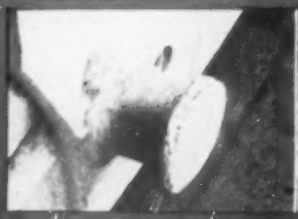

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Diesel-Electric Locomotives for Quarry Operations

By G. W. JACOBS*

POWERFUL DIESEL-ELECTRIC locomotives pulling long freight trains are a common sight on our railroads today. But little does the average man think about the work required to prepare each car of these trains. They have to be loaded by various industrial plants and delivered to the railroads. A typical example is that of the rock quarry.

The "work-horse" behind the scenes is the switching locomotive that handles these cars at the quarry. Here, as well as on the railroads themselves, the diesel-electric locomotive is rapidly replacing the steam engine. There is no one size of locomotive that fits the needs of every quarry. The 25-ton and 45-ton sizes, however, are generally used in such operations. The quarry track is usually narrow gauge. Quite often the clearances in the quarry and at the crusher are such that a specially-designed, low-height or narrow cab must be used.

The "small" (25- and 45-ton) units are used in quarries for two reasons. First, the trackage is usually light weight and temporary. This means that axle loading must be relatively low. The 2-axle, 25-ton and the 4-axle, 45-ton units both meet this requirement. Second, one or more of these "small" units can keep rock moving at a continuous rate from the shovel to the crusher. A larger unit could haul more rock per trip, but it is advantageous to make frequent trips with smaller loads and sometimes utilize the running time to blast another section of the deposit. With this method of operation, the locomotive crews are not idle and the crusher is kept going at a nearly constant rate.

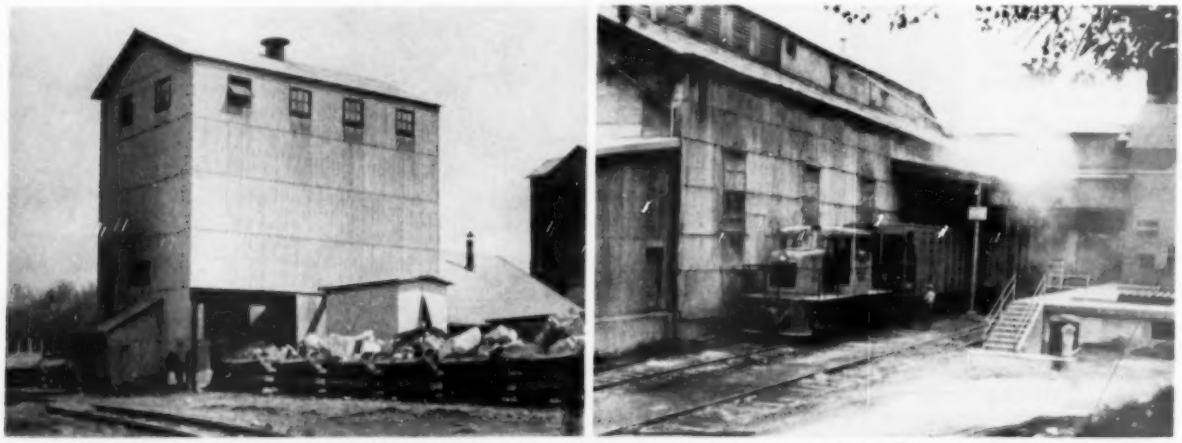
Quarry service demands a sturdy, simple type of motive power. Here the locomotives are worked to their capacity. The track generally follows the contour of the uncovered rock and has many sharp curves and short, steep grades. This causes alternate bunching and stringing out of the loaded cars in the train and imposes unusual strains on the mechanical structure of the locomotive. The right-of-way may be strewn with rock that have fallen from preceding trains. All these factors make such a track treacherous for larger locomotives. The 25-ton two-axle diesel electric, with its box-type understructure, readily meets these demands. Its thick side frames, end frames and deck plates are welded together into an almost indestructible unit. The 45-tonner, with its swivel trucks, is also well adapted to this work. Moreover, it can haul heavier loads, follow rough track more readily and is easier on the rails.

The inherent characteristics of the diesel-electric locomotive render it well adapted to work of this kind. The diesel engine delivers mechanical power to the generator where electricity is produced. This is then conducted to the driving motor through flexible cables. The generator-traction motor combination is, in effect, a transmission with an infinite number of gear ratios which smoothly and automatically shifts to the best one for the conditions of the moment. This electric drive has ample capacity to perform the required service. Also it acts as a cushion against track shock, isolating the diesel engine from the axles, wheels and rails. The net result is that the power plant operates under nearly ideal conditions.

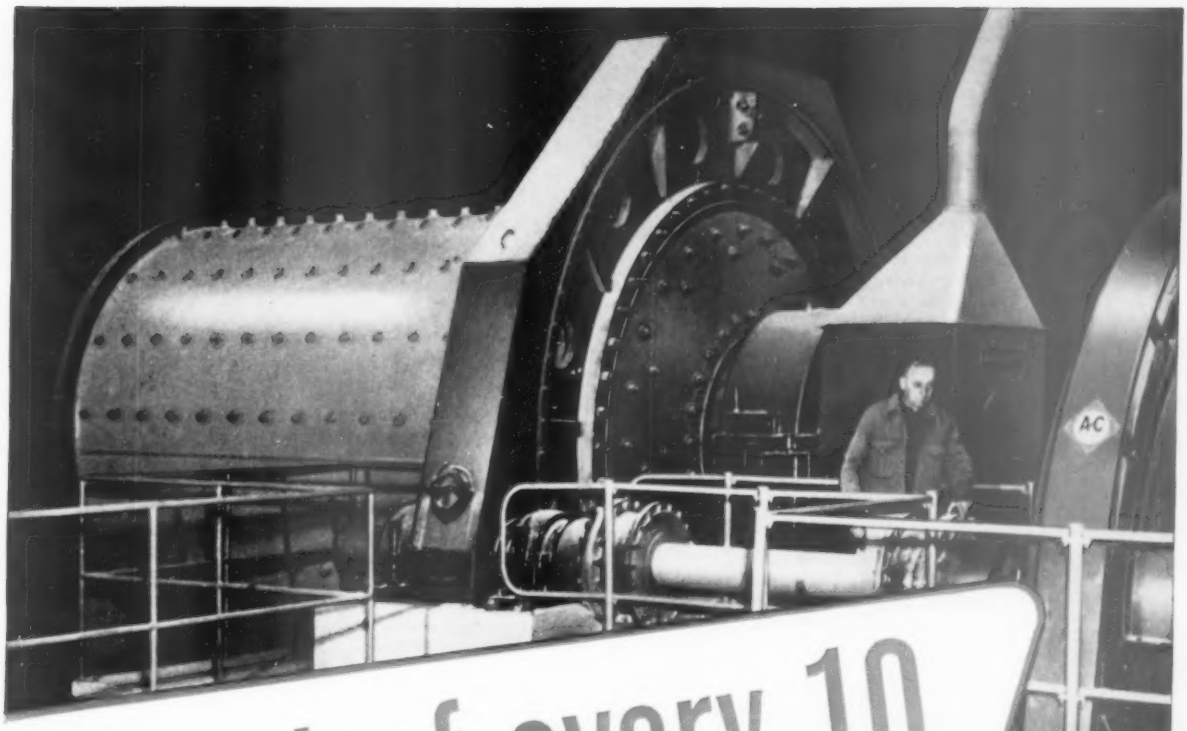
Added to the rugged load conditions under which the diesel-electric locomotive must work in a quarry operation is the dust-laden atmosphere. The air at the working face, the crusher and the loading bin is often saturated with dust and grit. The diesel engine must breathe this air for combustion, and the traction motors and generator must utilize it for ventilation. Ample protection is afforded to the engine by filters for fuel, lubricating oil and intake air. The motors and generators are so constructed that dust or grit entering with the cooling air is generally blown out the outlet ports without lodging in the machines. All motor and generator bearings are fitted with seals to prevent the entrance of dirt.

Quarry work may be one of the

*Locomotive and Car Equipment Dept., General Electric Co., Erie, Penn.



Left: A 25-ton, two-axle diesel-electric locomotive hauling rock out of the quarry. Right: A 45-ton, swivel-truck type locomotive used for switching in a cement plant



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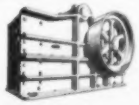

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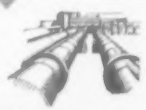


Kilns, Coolers, Dryers

most severe applications for any type of locomotive. The rugged roadbed, extreme loads, and dust-polluted air all demand a locomotive that "can take it." The diesel-electric switcher has successfully fulfilled this requirement. At the same time it has produced tremendous savings over previous steam operations.

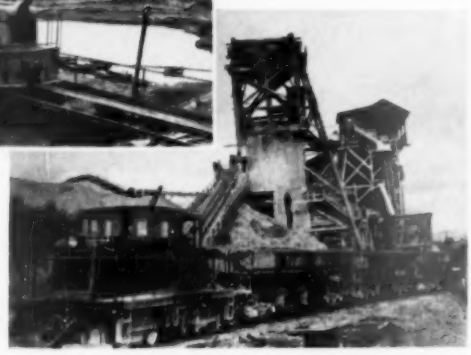
A typical example of the economies realized by using diesel-electric locomotives is found in this statement from a quarry superintendent: "The two diesel electrics paid for themselves in six months through savings in operation, labor and increased production." Other owners claim that their switching costs have been cut practically in half. The usual savings resulting from operations alone (excluding increased production) amount to approximately 30 percent of former steam locomotive costs. At this rate, the diesel-electric locomotive will pay for itself in a little over three years through operating savings alone.

A cement company in Maryland claims to have cut its switching costs almost in half when it installed a G-E 45-ton diesel-electric locomotive. A 63 percent reduction in fuel cost, simplified maintenance work, push button starting, plus other inherent advantages of the diesel electric have made such results possible. The steam locomotive ran only two and a half hours before refueling was necessary. In contrast, the diesel electric requires only 10 min. of fueling time every three days. Even if the few minutes necessary for daily servicing are added, the diesel electric still has an availability of better than 94 percent.

A locomotive operator who has been working in quarries since 1921 said, "When operating one of the steam dinkies, I have to hang way out of the window to switch cars. I don't need to do this with the diesel electric. Because of this the diesel-electric switcher is a lot safer, too. It is dangerous switching cars across the road that goes through the quarry. I can see much better from the diesel electric."

A limestone plant in central Ohio uses a 45-ton diesel-electric switcher. The operators claim that, since its installation in 1947, the locomotive has saved them $1000 a month. This means that the locomotive has already paid for itself. When it replaced a 65-ton steam locomotive, fuel costs dropped from $15 a day to a little over $2 a day. The locomotive has been on the job 9 hr. a day, 6 days a week. In that time it does the same work that the steamer did in two 8-hr. tricks daily. In over two years of continuous service, this unit did not lose a day.

An Ohio gravel plant reports that its cars are spotted at the dragline field hoppers in 20 percent less time than with steam locomotives. In addition, refueling time has been cut to one 15-min. period every four days. The locomotive requires less than 200 hr. a year for inspection, refueling and maintenance. This contrasts with 600 hr. required for the same service on the steamer. As a result, the diesel-electric locomotive is available for use over 97 percent of the time, day and night.



Above: Locomotive spotting cars over track hoppers at a sand and gravel operation

Right: Switching with a diesel-electric unit at a large aggregate plant

These are the experiences of only a few of the many rock products operators who use diesel electrics. In all cases, great savings have resulted from the substitution of this form of motive power for steam locomotives. Reliable, efficient and safe car handling is made possible. The locomotives start at the push of a button. They are clean and economical in operation. There is no coal or ash handling problem, no boiler maintenance work, no watching or watering. The maintenance chores and refueling jobs can usually be done when the locomotive is off duty. The availability is from 90 to 95 percent. The smooth application of power permits heavier loads to be hauled.

Kentucky Limestones

THE KENTUCKY GEOLOGICAL SURVEY, in cooperation with the Agricultural and Industrial Development Board of Kentucky, has published the report of Investigations No. 4, "Industrial Limestones of Kentucky—No. 2," by John A. Stokley and Arthur C. McFarlan.

The report, based on current investigations of the industrial limestone deposits of Kentucky, is a progress report of a continuing investigation. A previous report, "Industrial Limestones of Kentucky," published in 1949, outlined the belts of probable high-calcium limestones and listed a number of general chemical analyses of limestones from a few quarries. Report No. 2 is based on more recent field investigations and additional and more detailed chemical analyses of the stratigraphy involved, indicating certain locations in the high-calcium limestone belts which contain favorable deposits of industrial limestone. The chemical analyses were made in cooperation with the College of Engineering, University of Kentucky. The more promising limestones are said to occur in eastern Kentucky in the Lower Chester formations and in southern and western Kentucky in the Ste. Genevieve and Lower Chester formations.

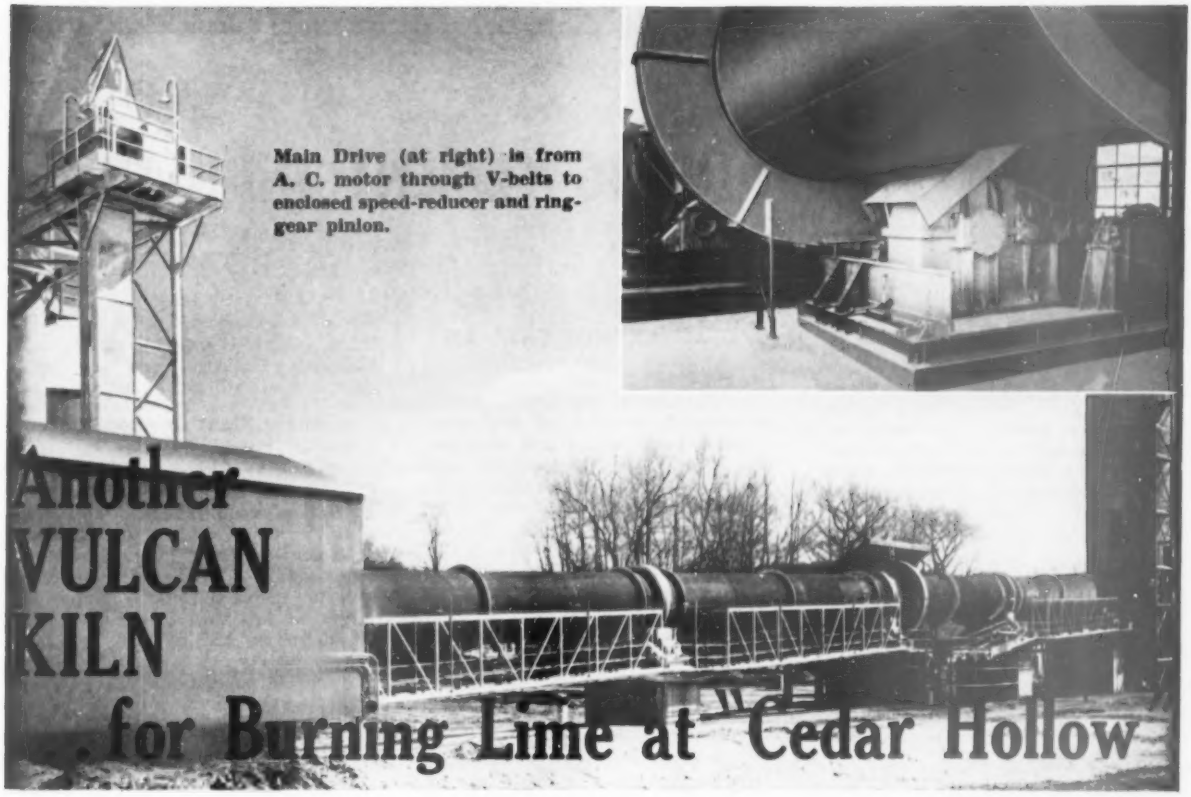
The report contains 94 pages and includes several illustrations, charts and selected references. Topics discussed include: stratigraphic notes; favorable areas; methods of investigation; definition of terms; and quarry reports.

Insulating Board Products

KAISER GYPSUM, Oakland, Calif., division of Henry J. Kaiser Co., recently announced the addition of insulating board products to its other building materials.

The insulating products, manufactured in Oregon of wood fibers, include insulating board in a variety of sizes, shapes and colors for interior and exterior construction of homes and commercial buildings. Among them are pre-decorated building board, plank and tile for paneling interiors, acoustical tile for sound control, insulating lath as a plaster base, sheathing for exterior walls and roof insulation. The insulating materials will complement the company's present gypsum products which include wallboard, sheathing, plaster, lath, mineral acoustical tile, lightweight plaster aggregate, paint and accessories.

Kaiser Gypsum will distribute its new products through its existing field organization in Washington, Idaho, Utah, California, Nevada, Arizona, Alaska and Hawaii. In addition, perforated acoustical tile will be handled on a national basis. James Hague, formerly with Kaiser Gypsum's sales organization in Los Angeles, will be the company's sales manager for the insulating products, with headquarters in Oakland, Calif.



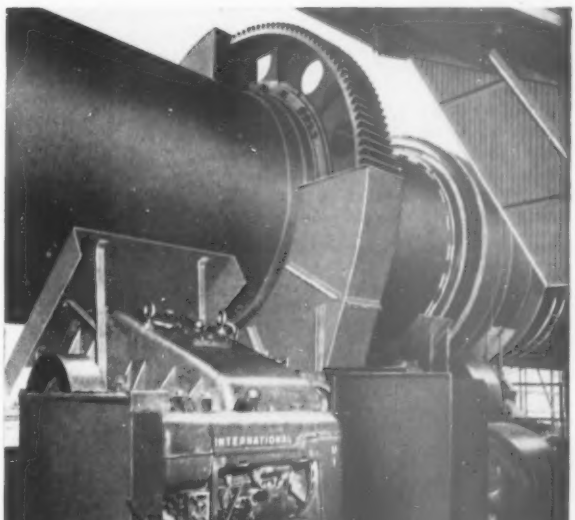
Main Drive (at right) is from A. C. motor through V-belts to enclosed speed-reducer and ring-gear pinion.

Another VULCAN KILN for Burning Lime at Cedar Hollow

When the Warner Company's Cedar Hollow, Pa. plant first went into operation, in 1916, it was equipped with an 8' x 150' Vulcan Rotary Kiln which is still in operation and still giving good service. To meet the need for greater capacity, however, another Vulcan Rotary Kiln has recently been installed as shown in the illustrations.

The new kiln is not only much larger (9' x 300') but also embodies every modern feature to assure efficient, economical operation. The very heavy all-welded steel shell is mounted on our latest-type supporting roller and thrust bearings; all of which are automatically lubricated and easily adjusted to compensate for wear or moderate misalignment. Main drive and auxiliary drive both have an ample margin of power over any probable requirement and are as fully enclosed as possible, to promote cleanliness and safety. Other features, specified by the Warner Company's experienced engineers and production executives, assure maximum capacity and minimum fuel consumption under their particular operating conditions.

Detailed information regarding Vulcan Rotary Kilns for lime plants, cement plants, and other modern applications is given in our 28-page, fully illustrated, bulletin No. A-442. Write for it if you can use it to advantage.



Auxiliary Drive (above) is from gasoline engine through Morse clutch-coupling and V-belts to same enclosed speed reducer as for main drive.

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TURKEY'S EXPANDING CEMENT INDUSTRY

By C. MacARTHUR CARMAN*

THE IMPORTANCE OF TURKEY as a key country in the European defense system makes it interesting to examine its industrial potential. Prior to World War I, Turkey was a typical Middle East country, backward, unprogressive and undeveloped. Its economy was almost exclusively based upon agriculture and sheep. Practically no industries were in existence.

Immediately following the close of the war, the Sultan was deposed and banished and Turkey was taken over by a group of young Turks directed by Ataturk. This group established a democratic form of representative government and inaugurated a drastic long range program of reform and development. The old language and customs were thrown out. Railroads and highways were constructed. A large merchant marine fleet was acquired to serve the country's long coast line and to further foreign commerce.

Almost overnight Turkey emerged as the most modern and progressive country in the Middle East, with rapidly growing industrial plants, an improved agricultural program, and with its other natural resources being developed rapidly. Practically all of this transformation was made under the direction of the Ataturk group, and as a government project. Consequently most of the new industries are state owned and managed. This trend was reversed to some degree by the 1950 election which brought into power a new party favoring private ownership. This objective was endorsed by the E.C.A. when it was established in Turkey.

Under the present administration the great development plan is being pushed vigorously, and is being assisted in every possible way by many U.S. agencies set up for this purpose. Considering the fact that this tremendous program was not established until 1927, the results have been impressive. It must also be understood that Turkey has never had the advantage of a large income from oil production as have Iran, Iraq, and some of the other Middle East countries.

It naturally follows that a large quantity of portland cement was required to carry out this construction program. And the tiny Turkish portland cement industry was incapable of supplying this demand. It therefore became necessary to import the cement required, or to expand this basic industry. Due to the ever chronic shortage of foreign exchange it was deemed best to increase manufacturing facilities, and this was done and is still going on.

*Consulting engineer, New York, N.Y.

Cement Plant Development

The original portland cement plant in Turkey was that of the Arslan Cimento Fabrikasi, established in 1910 at Darica, near Istanbul. This was a small, 40,000 metric ton (240,000 bbl.) per year plant designed by F. L. Smidth & Co. The Darica plant is still in operation and is being enlarged at this time to a capacity of 65,000 metric tons (450,000 bbl.) per year.

A second small plant near Eskisehir, designed by Krupp, was never able to make a satisfactory cement at a profit, and was abandoned in 1920.

A third small plant was erected at Bakirköy, near Istanbul. This also proved to be unprofitable, and was enlarged in 1926 to a capacity of 12,000 metric tons (72,000 bbl.) per year. The Bakirköy Cimentolari Türk Anonim Sirketi owned and operated this plant—however, it never was able to operate profitably and has been abandoned.

One of the most important projects of the Ataturk group was the construction of an entirely new and modern capital city at Ankara, and the removal of the seat of government there. To provide some of the cement required for this major project a small vertical kiln portland cement plant was constructed by the municipality of Ankara. This is owned by Ankara Cimento, Ltd. The capacity of this plant is 15,000 metric tons (90,000 bbl.) per year. While the plant operates profitably its product quality is inferior and is not approved for government use.

The two most important plants were built at the same time, in 1930. One was constructed at Kartal, near Istanbul, on the Asiatic shore of the Marmara Sea. It is owned by Anadolu Cimentolari, T.A.S., and had an original capacity of 60,000 metric tons (360,000 bbl.). In 1937 the capacity was increased to 120,000 metric tons (720,000 bbl.) per year; and is presently being enlarged again to a capacity of 250,000 metric tons (1,500,000 bbl.) per year. The plant was designed and built by F. L. Smidth & Co. It is owned jointly by F. L. Smidth and by private Turkish capital. The current enlargement was financed through E.C.A.

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Table I. Portland cement manufacturing capacity—Turkey (metric tons)

Area	Company	Pre-1950 capacity	Authorized new capacity	Estimated final capacity
Istanbul				
1.	Arslan ve Eskihisar Müttehit Cimento Fabrialari, T.A.S.	40,000	25,000	65,000
2.	Anadolu Cimentolari, T.A.S.	120,000	130,000	250,000
3.	Türk Cimentolari ve Kireci, T.A.S.	120,000	130,000	250,000
		280,000	285,000	565,000
Ankara				
4.	Ankara Cimento, Ltd.	15,000	———	15,000
Sivas				
5.	Sümerbank Cimento Sanayi Müessesi	100,000	100,000	200,000
Izmir				
6.	Izmir Cimento Fabrikasi, T.A.S.	———	150,000	150,000
Totals		395,000	535,000	930,000

The second of these major plants is that of Türk Cimentolari ve Kireci, T.A.S., near Istanbul at Zeytinburnu, on the European shore of the Marmara Sea. This was designed by Miag as a single kiln wet process plant having a capacity of 120,000 metric tons (720,000 bbl.) per year. Some old vertical kilns are still installed in this plant and are still operated in emergencies. This plant is currently being enlarged to a capacity of 250,000 metric tons (1,500,000 bbl.) per year, the improvement being financed through the E.C.A. This company is owned jointly by private Turkish capital and by Swiss capital.

As the persistent cement shortage continued in Turkey, the government embarked on a portland cement plant construction program. Sümerbank Cemento Sanayi Müessesi, a wholly owned government company, was formed for the purpose. A 100,000 metric ton (600,000 bbl.) per year capacity plant was constructed at Sivas, to the east of Ankara. This plant was completed in 1943. It was designed and equipped by Humbolt, a German firm. In 1950 additional equipment was purchased to double the capacity of this plant.

The government cement program included the construction of three additional plants. One was to be erected at Izmir, on the western coast; one at Zonguldak, on the north (Black Sea) coast; and one was planned for the Adana-Tarsus area on the southern (Mediterranean Sea) coast.

In 1950 the government placed an order for the machinery for the Izmir plant with F. L. Smidth & Co. However, also in 1950, the general election was won by a new party which was opposed to further government ownership of industry. The E.C.A. program is also opposed to any but private ownership. The government equity in this Izmir project was then taken over by a private company, Izmir Cimento Fabrikasi, T.A.S., and granted E.C.A. assistance. At the same time the enlargement of the Sivas plant was held up. This new Izmir plant should go into operation this year. The Adana-Tarsus project was undertaken privately, but failed to get government approval that is required for E.C.A. assistance, and was abandoned.

It is now questionable whether or not the plant proposed for Zonguldak will be built, at least for the present. The enlargement of each of the two major plants near Istanbul will more than provide the additional capacity to be provided by the Zonguldak plant.

The current situation of the Turkish cement industry is summed up in Table I.

Cement Requirements

The demand for cement in Turkey has been far in excess of the manufacturing capacity for many years. For example, with a total manufacturing capacity of approximately 400,000 metric tons per year, the companies have continuously had firm orders on their books totalling more than 600,000 metric tons. Strict foreign exchange and import license controls have limited the importation of cement effectively. The result of this situation is an acute shortage which may not be relieved until the authorized new manufacturing capacity can become available.

With a population of 20,000,000 in 1950, the per capita consumption is still very low in Turkey, only 22.5 kilograms. This compares with that of neighboring and less developed countries: Syria and Lebanon, 68 kg.; Palestine, 105 kg.; and Greece, 40 kg.

It is thus evident that the Turkish market can absorb at least twice the current production, and should easily attain a total of 1,000,000 metric tons (6,000,000 bbl.) per year. Experts of the Turkish government who have studied the future market agree that a 1,000,000 metric ton per year production will be absorbed as soon as it can be made available.

The actual statistics covering the production, importation, and consumption of portland cement in Turkey, by years, are shown in the Table II.

There is a definite overproduction of cement in the Istanbul area, which will be aggravated when the new production facilities are placed in operation. This means that a considerable quantity of cement must be shipped out of this area to the more distant points of Turkey.

Economics

The selling price of cement is uniform for all points of production, and is regulated by government price ceiling regulations. In addition the rail freight rates on cement on the government owned and operated railroad are on a uniform metric ton-kilometer basis from all producing points. The only exception is the rate from Istanbul and from Sivas to Ankara, which takes a special 25 percent lower rate than to any other point. Thus the delivered cost of cement to the more distant points becomes prohibitive.

In the Istanbul area the freight cost represents not more than 26 percent of the cost of cement in sacks at the plant, while the customers of the Sivas plant average a freight cost of about 42 percent of the f.o.b. plant cement cost in sacks. The more distant points supplied from either of these manufacturing points must pay a freight charge amounting to 100 percent of the cement cost f.o.b. plant. As there are no closer plants the use of cement is thereby restricted by this excessive delivered cost. Mill prices are $21.40 per metric ton, in paper sacks, which is equivalent to $3.67 per bbl.

As all but the Ankara and Sivas plants are located on the seacoast, and as most of the Turkish border is seacoast, a great deal of cement is shipped directly from the plants by water. Water freight rates are less than half of rail rates. Much cement is also moved by trucks.

The plan of the government to build additional plants at Zonguldak and at Adana-Tarsus would reduce the cost of cement delivered to points in the eastern section of the country.

Fuels and Power

Coal is the only fuel now used in all of the existing cement plants. Lignite will be used in the new plant at Izmir. All coal is produced in the state-owned mines at Zonguldak, on

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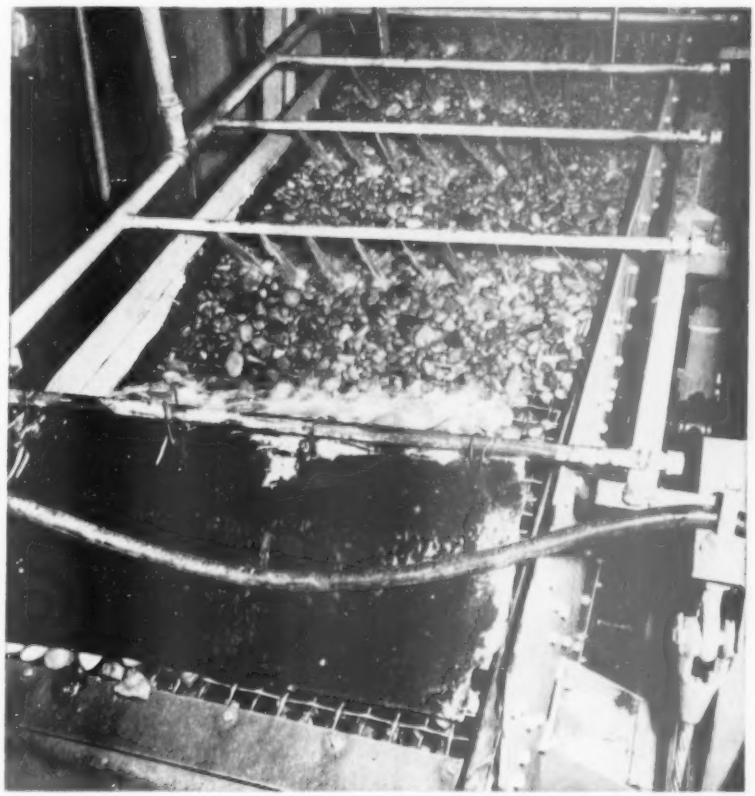

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the Black Sea coast. These mines are being enlarged through E.C.A. help to at least twice the old capacity. The delivered cost at Ankara, by rail, is $11.78 per metric ton; and at Tarsus, by water, $17.85 per metric ton. A typical analysis of this coal follows:

Carbon	58.15 percent
Volatile	28.89 percent
Ash	12.96 percent
	100.00 percent
Average H_2O	10.32 percent
Sulfur	0.75 percent
Heat value	6,750 kg. cal.
	12,150 B.t.u./lb.

The lignite to be used at the Izmir plant will come from the Soma fields. This is reported to contain 20 percent H_2O, and to have a heat value of 5400 kg. cal. The delivered cost will be $6.90 per metric ton.

So far Turkey has no important production of oil. Some wells have been brought in in southeast Turkey, but the production is too little to be of commercial value, and the producing area is too far from any industrial market to be used. No pipelines have been built, there are no refining facilities, and no tank cars are available for rail shipment. Should the production increase, this fuel will become available.

Gypsum is found and is produced in Turkey at a reasonable cost.

Power is available both from steam plants and from hydroelectric plants, but not in every possible cement plant location. The Istanbul plants purchase power at about 1 cent per kw.-hr. Additional power plants are under construction and others are planned for the future. There are many sites for hydroelectric plants in the interior mountains.

Labor Supply

Labor is plentiful at all cement plant locations, and is of good quality. Hourly labor rates are still low by American standards. The average hourly employe is paid 6 lira per 8 hr. day, which is equivalent to $2.40 per day or $0.30 per hr. The managers of the principal plants are experienced Europeans. Labor use was on the lavish side in all plants inspected. One 2000 bbl. per day capacity plant employed 550 men total, without a power plant, but including a paper sack plant. Almost 50 percent of this number were employed in the quarry, which was an exceedingly difficult quarry to operate because of gumbo clay.

The plants inspected were found to be well maintained. All plants were open circuit in both raw and clinker grinding departments. Fuel practice was carefully watched, but was not below U.S. figures.

Cement Specifications

Quality of cement was well maintained in the larger plants, but was below specification in some of the small vertical kiln plants. Turkey has established specifications for cement, which correspond closely to European practice. Standard cement must be ground to 86 percent minus 4900 mesh screen (178 mesh U.S.), with not more than 1 percent retained on the 900 mesh screen (76 mesh U.S.). Raw material is usually ground to the same screen fineness. No turbidimeters are in use.

Tensile strength requirements (3:1 sand-cement) are 312 p.s.i. at 7 days and 384 p.s.i. at 28 days. Compression tests with 3:1 sand-cement ratio must exceed 4266 p.s.i. at 7 days, and 4980 p.s.i. at 28 days.

Chemical limits are MgO, 4.0 percent maximum; SO_3, 2.5 percent maximum; insoluble residue, 0.85 percent maximum; loss on ignition, 3.0 percent maximum; and specific gravity, 3.05 percent.

Table II. Turkish cement statistics (all figures metric tons)

Year	Shipments	Imports	Consumption
1927	37,836	66,175	104,011
1928	65,076	52,625	117,701
1929	65,401	78,805	144,206
1930	87,635	60,079	147,714
1931	100,977	30,786	131,763
1932	121,352	2,313	123,665
1933	138,754	1,919	140,673
1934	192,350	812	193,162
1935	176,028	954	176,982
1936	201,473	5,689	207,162
1937	206,925	52,174	259,099
1938	284,263	44,255	328,518
1939	281,151	90,858	372,009
1940	268,719	8,288	276,469
1941	278,719	30	278,749
1942	190,209	31	190,240
1943	148,036	4,316	152,352
1944	281,975	11,204	293,179
1945	269,080	2,206	271,286
1946	325,088	542	325,630
1947	358,500	3,237	361,837
1948	331,000	100,000	431,000
1949	392,000	26,000	418,000
1950	400,000*	75,000*	475,000*
1951	415,000*	110,000*	525,000*
1952	600,000*	30,000*	630,000*
1953	715,000*	5,000*	720,000*
1954	790,000*	10,000*	800,000*
1955	800,000*	80,000*	880,000*
1956	800,000*	160,000*	960,000*
1957	800,000*	200,000*	1,000,000*

*Estimated

Kansas Silica Sands

THE KANSAS STATE GEOLOGICAL SURVEY, University of Kansas, recently issued two reports listing certain Kansas sands as promising sources of silica sand suitable for use in glass manufacture and for foundry uses.

The first of these reports, "The Cheyenne Sandstone of Barber, Comanche and Kiowa Counties, Kansas, as Raw Material for Glass Manufacture," written by E. K. Nixon, R. T. Runnels and R. O. Kulstad, indicates that the sands of the area studied have a 95 percent or more silica content. The report, based on the findings of a joint explorative study conducted by the State Geological Survey and the Kansas Industrial Development Commission, includes such topics as the geologic occurrences of the sands, general characteristics, reserves, exploring and sampling, laboratory analyses and economic aspects. Several factors, such as ease of mining and transportation, mild climate and nearby natural gas supply at reasonable rates, are said to favor development of these sands.

The second report, "Silica Sand from South-Central Kansas for Foundry Use," by Kenneth Rose, indicates that the Cheyenne sandstone meets the requirements of foundry sand, in refractoriness, grain size, durability and workability, and that it could be easily and economically developed.

D.P.A. Aids Small Firms

IT WAS RECENTLY ANNOUNCED that portions of the Defense Production Administration's mining machinery and crawler-type tractor production capacity expansion goals have been reserved exclusively for small business concerns to give them an opportunity to maintain their pre-Korean share of the production facilities in their industries. The recent ruling will assure rapid tax amortization and other government benefits to small business firms in expanding their production capacity.

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N.C.S.A. BOARD REVIEWS YEAR'S ACTIVITIES

Research, field work and government regulations receive attention. Next summer's meeting tentatively scheduled for Canada

THE BOARD OF DIRECTORS of the National Crushed Stone Association, meeting at Hot Springs, Va., July 24, voted to hold their next summer meeting at the Seigniory Club in Quebec Province, Canada, if a suitable date and accommodations can be arranged. This decision was largely influenced by a desire to honor the Canadian member of the board, H. G. L. Harstone, of Hamilton, Ont., who several years ago invited the board to meet in Canada. The Club is several miles north of Montreal and is familiar to some members of the board who have visited there.

The meeting was one of the best attended in the history of the association. An additional feature of interest was a special meeting of the executive committee of the Manufacturers Division of the association held on July 23, at which every member of the committee as well as two ex-chairmen, was present. Incidently, the chairman of the division, Irwin F. Deister, Ft. Wayne, Ind., later reported to the board of directors of the N.C.S.A. that it was the unanimous opinion of the Manufacturers Division that the Chicago convention and the exhibit of 1952 was the best ever. All of the members of the division who wanted to sat in as guests at the board meeting.

Necrology

The first business of the board was to adopt unanimously two resolutions in honor of two men who had a part in the history of the association. The first of these was an eloquent tribute to the late John Rice, who was one of the founders of the association in 1918 and was its second president. The resolution was prepared and presented by Otho M. Graves, chairman of the board of the General Crushed Stone Co., Easton, Penn., of which Mr. Rice was one of the founders and for many years its president and chairman of the board of directors. The other resolution was presented by Russell Rarey, Columbus, Ohio, and paid tribute to the late Henry A. Huschke, who for several years directed the agricultural limestone division of the association.

Staff Reports

A. T. Goldbeck, engineering director, made his usual interim progress report. He emphasized the limitations put upon his work by his small laboratory staff. His work covers a large field from fundamental research on concrete and bituminous mixtures, for the purpose of design, to tests of crushed stone from the quarries of various member companies to help operators settle disputes with engineer users. Many such tests lead into more extensive investigations which prove helpful to the entire industry.

Mr. Goldbeck reviewed some of the alleged shortcomings of concrete aggregates in freezing and thawing tests, the reaction between certain siliceous aggregates and portland cements high in alkalies. He also said: "There are other chemical causes of concrete expansion which have something to do with the continuous giving off of calcium hydroxide and of magnesium hydroxide in the presence of water—causes which even the specialists on this subject have not fully explained. There is one thing certain: the cement companies could do much to overcome these expansion troubles in concrete."

Typical problems presented to the association, which often require special tests and investigations, were listed by Mr. Goldbeck as follows:

"1. Tests for concrete making properties of a particular limestone sand.

"2. Routine tests on ledge rock samples for a number of quarries.

"3. Special investigations on cores drilled from several different quarries to determine the quality of the stone, and to locate the good and unsatisfactory stone so as to control the future operation of the quarries.

"4. Comparative tests of gravel and stone concretes made with particular coarse aggregates.

"5. Investigations of bituminous mixtures for stability and durability.

"6. Investigations on concrete making properties of samples of natural sands.

"7. Cooperative tests on railroad ballast. This is a large project involving the testing of some thirty-odd ballasts submitted by the railroads, together with a comparison of the tests with statements regarding their behavior service. This work is being done in cooperation with the Committee on Railway and Ballast of the American Railway Engineering Association. For the past five or six years your Engineering Director has been chairman of the sub-committee on ballast, but has now resigned so that a railroad engineer might be appointed.

"8. Check Los Angeles abrasion tests on a particular stone.

"9. Special investigation on the

The manufacturers division was well represented at the summer meeting of the N.C.S.A. directors. Shown here, seated left to right, are J. Craig McLanahan, McLanahan & Stone Corp.; Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind., chairman; J. R. Boyd, managing director, and Beatrice G. Gay of N.C.S.A. Standing, left to right, are Wayne W. King, W. S. Tyler Co.; Cottrell Farrell, Easton Car and Construction Co.; Horace C. Krause, Columbia Quarry Co., president of N.C.S.A.; L. A. Eiben, Northern Blower Co.; B. R. Maloney, E. I. du Pont de Nemours & Co.; and J. B. Terbell, American Manganese Steel Div., American Brake Shoe Co.

use of the air meter for investigating the density of asphalt paving mixture.

"10. Investigations on the efficiency of the heavy media separation process for removing deleterious chert from aggregate.

"11. Comparative tests of natural sand and stone sand for use in concrete.

"12. Determine particle shape of stone sands made from some parent rock by three different methods to determine the efficiency of these respective methods. Such a test throws light on the most desirable crushing machinery to use.

"13. Tests on stone for use in trickling filters.

"14. Cooperative tests on concrete with one of the State Highway Departments to determine the durability of a particular stone.

"15. Asphalt coating characteristics of particular rocks.

"16. Tests for the cause of inferior concrete.

"17. Particle shape of stone sand.

"18. Unit weight and voids in stone for use in trickling filters."

Joseph E. Gray, field engineer, supplemented Mr. Goldbeck's report with some of the details of his contacts with member companies and their jobs. As to his work in general, he said:

"The requests of members for assistance in their problems have been rather numerous, especially for the first half of this year. Yet, all requests have been taken care of with reasonable promptness and, I believe, with thoroughness. A question frequently asked of me is 'Can one person do this work for the entire membership?' The answer is that one person can do the field work, that the members are reasonable in their demands, and that the solution to many problems requires research studies and laboratory tests, which phase of the problem is referred to Mr. Goldbeck and his staff. However, the accumulation of field experiences is an immense asset toward the expeditious handling of these problems. It, therefore, can be reported that the membership is receiving adequate individual engineering service under the present organizational arrangement.

"This calling on members is, in fact, an effective means of disseminating information and making the services of the association individually helpful. There is no outstanding feature of this work, for it is the accumulation of many smali services that makes it of value. One illustration will suffice: a member had an operating problem and I told him of another member who had, in the past, solved the same problem to his satisfaction. It happened that the two members were good friends but had never discussed this particular problem, so they soon got together and the problem was solved. While I can take no credit for any accomplishment, nonetheless, a helpful service was rendered."

Administrative Report

J. R. Boyd, administrative director, in his progress report, showed that the association is in a very healthy financial condition. This was later recognized by the board, which took action to establish a pension fund to provide retirement incomes for the staff of the association. Most of the rest of Mr. Boyd's report was devoted to discussion of various government regulations which are hampering all industry.

Referring to the Walsh-Healey Act (to which, incidentally, ROCK PRODUCTS has devoted considerable space in recent Labor Relations articles) Mr. Boyd said:

"At first glance, developments with respect to the Walsh-Healey Act would not seem to be of great importance to crushed stone producers as but a relatively small proportion of the industry is subject to its provisions. The determination of a prevailing minimum wage under Walsh-Healey, as a device for ultimately increasing minimum wages above those provided for in the Wage-Hour Law, gives a different slant to the situation. Particularly is this true and of real concern when it is recalled that the crushed stone industry has for some time been on the list of those scheduled for a prevailing minimum wage determination."

Committee Reports

Russell Rarey reported the success of his committee on percentage depletion in getting the law so changed that member companies whose fiscal years varied from the calendar year would get equal benefit. Otho M. Graves reported on arrangements for the next annual convention to be held in New York City the first week in February, 1953. His program followed the pattern established for the past several years, with considerable time devoted to nationally known orators from outside the industry. In this way, Mr. Graves contends, the prestige and self-confidence of the industry has been built up and is maintained.

Registration

The following directors were present: H. C. Krause, chairman and president of the association, St. Louis, Mo.; O. E. Benson, Easton, Penn.; L. J. Boxley, Roanoke, Va.; J. Reid Callanan, South Bethlehem, N.Y.; Bruce S. Campbell, Towson, Md.; H. A. Clark, Chicago, Ill.; T. C. Cooke, Swampscott, Mass.; Arthur F. Eggleston, Meriden, Conn.; Wilson P. Foss, III, New York, N.Y.; Arthur Goff, Bay Port, Mich.; Otho M. Graves, Easton, Penn.; N. E. Keib, Indianapolis, Ind.; G. D. Lott, Jr., Columbia, S.C.; M. E. McLean, East St. Louis, Ill.; A. W. McThenia, Fort Spring, W. Va.; Verne C. Morgan, Louisville, Ky.; John H. Odenbach, Rochester, N.Y.; J. V. Owens, Utica, N.Y.; H. E. Rainer, Buffalo, N.Y.; Russell Rarey, Columbus, Ohio; J. A. Rigg, Fort Spring, W. Va.; Warren C. Rowe, Malden, Mass.; James Savage, treasurer, Buffalo, N.Y.; Nelson Severinghaus, Decatur, Ga.; O. M. Stull, Buchanan, Va.; F. B. Thacher, Lowellville, Ohio; D. L. Williams, Ripplemead, Va.; W. F. Wise, Dallas, Texas. The honorary membership of the board was represented by Stirling Tomkins, New York, N.Y. The Manufacturers Division was represented by all three of its board members: Irwin F. Deister, Fort Wayne, Ind.; Wayne W. King, Cleveland, Ohio; J. Craig McLanahan, Hollidaysburg, Penn.

Financing Plant Expansion

E. V. HALE AND CO., Chicago, Ill., in its 1952 yearbook of "Private Placement Financing," reported that ten manufacturers of building materials and four construction and engineering concerns obtained $32,000,000 and $13,925,000 respectively from life insurance companies and other institutional investors in 1951.

Largest loan in the building materials group was $6,800,000, covered by 9-yr. serial notes of Missouri Portland Cement Co. National Gypsum Co. sold $6,000,000 notes, including $3,200,000 in 16-yr. notes at 3.25 percent and $2,800,000 in 8-yr. notes at 2.75 percent. Other borrowers included North American Cement Corp. ($1,000,000), Warner Co. ($965,000), Idaho Portland Cement ($500,000), and Ingalls Stone Co. ($240,000).

Determination of Magnesium in Cement

A COLORIMETRIC METHOD for determining magnesium content in limestone, cement raw mix, clinker and finished cement has been developed by K. G. Kawe Andersson, AB Gullhögens Bruk, Skövde, Sweden, and reported in *Analytical Chemistry*, June, 1952, page 1028 (Vol. 24, No. 6). The author claims the method to be more accurate than the oxine method, and to give values 0.1 or 0.2 percent lower than the pyrophosphate method, but it is his opinion that the latter gravimetric analysis gives values that are somewhat too high.

The method employes the reagent brilliant yellow as indicator for revealing both the carbonate and silicate compounds of magnesium. Briefly, the procedure consists of dissolving the raw material in hydrochloric acid (in a platinum crucible placed in a high-frequency induction coil). A stabilizer is added to prevent precipitation when adjusting with 10 percent NaOH solution to a pH of 5 or 6. The stabilizer used is Tylose (ethyloxyethylcellulose). Photometric examination of the mixture is made at 550 mμ.

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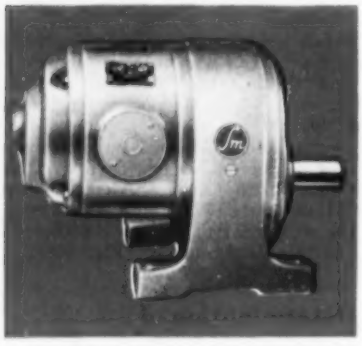

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Deposit Depletion

(Continued from page 70)

Feeding the belt is a portable steel hopper mounted on skids, under which is a small apron feeder that places a continuous flow of material on the belt. The feeder is driven through a Dodge torque-arm speed reducer. This type reducer is also used on some of the belt drives. The whole belt conveyor system is approximately 1 mile long and replaces 10 to 12 trucks. Trucking over the soils in this deposit presents extreme difficulties during wet weather.

The digging operations are a little different from most operations: there are two draglines, both 2½-cu. yd. units equipped with Hendrix buckets. One strips and casts the strippings back into worked out portions of the pit, then digs the gravel and piles it on top of sections of the stripped off areas. This allows the gravel to drain thoroughly, after which the second dragline loads it to the field hopper. This method of handling keeps the wet muck off the belts, for there are

The field conveyor is mounted on short steel legs which keep the return belt about 16 in. above ground. Note self-aligning carrier rolls

some clay inclusions in the matrix, some of which are picked off in the field and the remainder are removed at the plant by a battery of Eagle log washers. One of the draglines is a Bucyrus-Erie 54-B, and the other a P&H 955. Both have 80-ft. booms. The two units interchange on stripping and digging.

The discharge end of the field belt system makes use of a swinging conveyor section that operates on an 85 ft. radius. This section can feed the main permanent belt conveyor to the plant, or can build up a stockpile of material alongside the feed hopper that can later be reclaimed to the feed hopper.

The first screen in the plant is a small 6- x 9-ft. unit. The fines from it are pumped to waste along with other waste water, and the oversize falls to a rotary scrubber screen followed by a 3-deck Robins Eliptex screen. Products from this screen can fall to storage below, or can be conveyed by belt to an intermediate surge pile and later returned to the plant from a belt operating in a concrete tunnel under the intermediate pile. Or, the coarse fraction can be sent to Eagle log washers which in turn unload to the ground storage below. Or, alternately, the offbearing belt from the triple-deck screen can by-pass the intermediate surge pile belt and discharge to a double-deck Robins vibrating screen; the products from this fall to storage below. Five sizes of gravel from 2 in. down are prepared. Sand is secured from a company made sand drag. The log washers operate at a relatively high speed so that the mass of gravel in the unit is thoroughly scrubbed. The unit operates at 36 r.p.m., driven by a Fairbanks-Morse 75-hp. motor. Water for the plant is pumped by a 10-in. Fairbanks-Morse pump powered by a 150-hp. motor.

Reclaimed gravel from the tunnel is conveyed by belt to a final rotary rinsing screen that is mounted over four steel truck bins. Under the rotary screen is a shuttle belt that can load cars as well. The plant is on the Texas and New Orleans Railroad, a branch of the Southern Pacific. Two cranes, a Bucyrus-Erie 34-B and a Koehring 303, are used to load sand and stockpiled material to trucks.

Personnel

J. Rutledge Hill is president of Gifford-Hill & Co. H. M. Lacy, F. R. Gifford, J. Howard Wilson, J. A. Whyte and P. B. Keller are vice-presidents and R. E. Wynne is secretary-treasurer. J. W. Higgs is chief engineer. Superintendent of the Seagoville plant is Jno. R. Hill, Jr. and plant foreman is Dave Forsyth. Seagoville is 20 miles southeast of Dallas. The company's main office is located in Dallas.

●

Honor Employes

CARBON LIMESTONE CO. AND CARBON CONCRETE BRICK CO., Youngstown, Ohio, recently held their fifth annual "old-timers" banquet, in honor of all employes with five or more years of service. Service pins are awarded each year to employes with 5 to 30 years of service. After 30 years of service, employes are awarded watches.

Of the 275 employes, 163 have five or more years of service. One employe has attained a 45-year service record; four have 40 years of service to their credit; four have 35 years; 16 have 30 years; and there are 28 in the 25-year group.

Conveyor Belt Fasteners

THREE POINT BELT LACING CO., owned by Wilson Little, Peace Dale, R.I., has purchased the rights and equipment from Bristol Co., Waterbury, Conn., to manufacture the Bristol belt lacing which will be produced under a new trade name. Mr. Little announces he plans to produce mostly the sizes used on conveyor belting, largely used in the sand and gravel industry. He was formerly associated with W.O. & M.W. Talcott, Inc., Providence, R.I.

Unloading Cars

(Continued from page 75)

discharge facilities, a 50-ton car could be completely emptied in a matter of a few minutes when the material is not frozen. Freezing, of course, requires additional time for thawing. The single man required to operate the car shaker stands on the control platform well away from any danger of an accident. The accident rate for the entire coal unloading process was reduced down to a point where an accident directly related to the coal unloading was practically eliminated. The average age of men who operate the car shaker is around 60 years and the safety record they have built up in the coal unloading operation is something of which to be proud.

A car shaker will unload up to 15 cars of coal every hour, depending upon the capacity of the material handling system and switching facilities. In one installation, a series of cars are emptied, without moving the cars, by handling the car shaker with a mono-rail hoist and moving the shaker from car to car. Each car contains different analyses and is spotted over the correct receiving hopper. Thus the products can be blended.

The principle of the car shaker is simple. It must produce a relative movement between the slope sheet of the car and the material within the car. Too low a speed of the car shaker will not produce the necessary movement and too high a speed will damage the hopper car. By operating the car shaker only long enough to cause the material to flow out of the car, additional savings can be made in operating and maintenance costs.

Due to the variables that could enter into any given situation, the information contained in this article should be used with good judgment. The men responsible for unloading operations are best qualified to apply this information to their own situation.

Awarded Safety Plaque

THE FLORIDA PHOSPHATE DIVISION of International Minerals & Chemicals Corp. was recently cited for its outstanding accident-free record. Approximately 1100 employes worked a total of 2,093,383 man-hours, from February 23, 1951, to January 19, 1952, without a disabling injury. This was said to be a new world record for open-pit phosphate mining. In recognition of this safety achievement, a plaque was presented to the employes by Liberty Mutual Insurance Co. The presentation was made at a dinner attended by some 100 company and employe representatives. R. B. Fuller, manager of the Florida Phosphate Division, accepted the plaque in behalf of the group. Albert A. Waugh is the division's safety director.

COMPARE St. Paul's Added Values!

New heavy-duty St. Paul dump body teams with powerful 2L24 twin hoist to deliver "bonus payloads" for Grasso Construction Co., Beacon Falls, N.Y.

Up to 22% more payload capacity per dollar!

15 to 50% lower mounting costs!

Up to 300 lbs. less dead weight per unit!

New 1952 St. Paul hoist capacity chart

Class	Model	Wt. lbs.	Payload tons rating at body lengths shown									
			7'	8'	9'	10'	11'	12'	13'	14'	15'	16'
Standard Duty 4 new models	D-16	550	7¼	6								
	H-16	650		9								
	H-18	735			9	8	7					
	H-20	795			11½	10	9	8				
Heavy Duty 5 new models	L-20	870			14	12½	11	10	9			
	L-24	1020				15	13½	12	11	10		
	2H20	1370				20	18	16	14½	13	11½	
	2L20	1555				25	22	20	18	16½	15	13½
	2L24	1695				31	28	25	23	21	19	17

Note: 6 new conversion hoists for platforms also available.

Tear out this ad . . . use it to compare St. Paul's new "bonus capacities" with any other hoist on the market. You'll find St. Paul gives you *far more payload capacity per dollar of cost — at all body lengths!*

You'll also get more miles of smooth, trouble-free service — thanks to St. Paul's exclusive new uni-flex sub-frame, with full-floating tension rods, equi-lift strut arms and improved friction-free hydraulic system. See these great new 6 to 31-ton capacity St. Paul hoists and dump bodies at your St. Paul Distributor today — or mail coupon below for free literature.

St. Paul HYDRAULIC

Hoists & Dump Bodies • Rubber Loaders
Truck Patrols • Elevating End Gates

ST. PAUL HYDRAULIC HOIST
Customer Service Department
36123 Main St., WAYNE, MICH.
Send free booklet describing new St. Paul hoists and bodies.
Name_____
Position_____
Company_____
Address_____
City_____ State_____
5-RBC-4

USE OF LIMING IN SOIL CONSERVATION

THE MEETING OF the Agricultural Limestone Division of Pennsylvania Stone Producers Association, held in July in Harrisburg, was opened by chairman Leonard S. Fry, who briefly explained that the purpose of the meeting was to develop facts on the proper use of liming materials in the soil conservation program.

The Pennsylvania Secretary of Agriculture, Miles Horst, was the first speaker. He stated briefly that while Pennsylvania is recognized as a highly industrial state, agriculture is a $2½ billion business, and is therefore one of the important factors in the state's economy. This farming industry, he continued, has a decided leveling effect in the economy both in good times as well as in times of depression, and therefore the industry must not only be conserved, but must be continually improved. Agricultural limestone, he said, is one of the many items which are necessary in soil improvement, but it is also the basic element in maintaining soil fertility.

J. Martin Fry, head of the extension service of Pennsylvania State College, explained that the service has always been active in the use of liming materials in soil building and conservation. This was accomplished through the various county agents. Working closely with the county agents, he observed that the attendance at the various lime meetings was about 60 persons, which is about twice the average attendance of all other farm meetings held on other subjects. The liming program, Mr. Fry predicted, will continue for many years to come.

The director of the Agricultural Experiment Station, M. A. Farrell, stated that first of all we must recognize that fertile soil is our greatest natural resource. The soil is the food basket of all animal and plant life. Soil conservation is most necessary in order to maintain our food supply at the level required by the American people. He stated that his department has sponsored the Jordan Soil Fertility Plots which were started the year 1871. Numerous experiments over a long period established that liming is absolutely necessary at all times in order to realize the full value of other fertilizers. Manure and fertilizer, without the addition of limestone, will not maintain the high level of soil fertility.

The Pennsylvania Bankers' Association was represented by Roy G. Shaull, secretary. Mr. Shaull stated that the bankers in the state are very much concerned about how the farmer spends his dollar, particularly if it is a dollar that has been borrowed from the bank. He said they recognize the value of a proper soil testing program as an important part in the economic development of our soil resources. Such a program will have the full support of his group.

James Hutchison, vice-president of the County Agents Association, pointed out that he has been employed as a county agent over a long period of years, and he worked with many types of soils and used a number of methods for testing soils for liming requirements, among them the early litmus paper test and many other quick test methods. These methods did not indicate accurately the amount of liming material which was required, and a general rule of one ton of limestone applied to the acre was considered sufficient. With the introduction of the lime meter, all of the guess work has been taken out of the soil test, and he has been using a meter for some time. He gave his unqualified endorsement to its use.

Clyde Zehner, state chairman of the Production & Marketing Administration, testified to the value of the use of limestone, based on his early experiences as a farmer. He briefly discussed the 1953 Conservation Program which was set up by Congress. One of the requirements was that all farmers within a county would be canvassed by the county committeemen in order to determine their conservation needs, and no allocation of funds would be made until the county had been completely canvassed and all needs developed within the county.

Mr. Zehner discussed briefly the results developed in Columbia county where soil testing is a requirement during 1952 before a farmer can receive assistance from P.M.A. in the liming program. Generally, these tests indicated a limestone deficiency throughout the county.

Ivan McKeever, state conservationist, Federal Soil Conservation Service, discussed the various phases of what constitutes a permanent conservation practice and what was considered a temporary conservation practice.

The afternoon session was presided over by Dr. H. R. Albrecht, head of the Department of Agronomy, Pennsylvania State College. Dr. Albrecht called on various members of his staff to discuss soil testing equipment and liming requirements for various types of soils.

James H. Eakin, Jr., exhibited a number of pieces of equipment which had been used in the early days for soil testing, as well as one of the lime meters, pointing out the speed and accuracy when soils are tested using this.

Dr. A. C. Richer explained the reasons why our soils are becoming acid; the alkali is washed out by the rain. This is particularly true of the soils in the eastern part of the United States. With the use of the soil meter, he said that it is possible to measure the limestone requirement to within 1000 lb. to the acre.

Dr. F. G. Merkle presented a number of charts showing the effect of the use of limestone on acid soils, on soils that were just mildly acid, as well as on those that were nearly neutral. His charts showed the effects not only of the application of limestone but also of the addition of manure, and finally the addition of phosphate. These charts clearly indicated the high return which the farmer receives from the use of limestone together with other fertilizers.

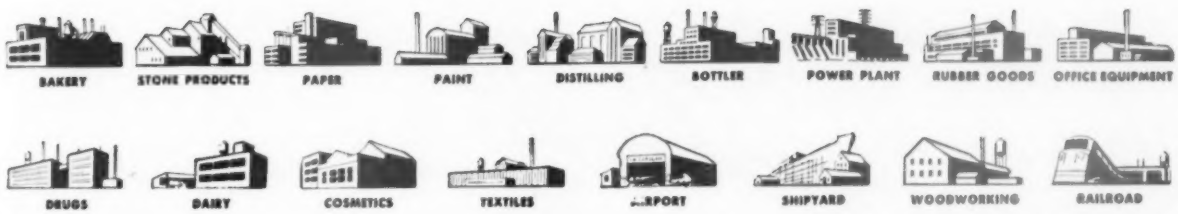
Dr. H. W. Higbee also presented a number of maps and charts showing how the soils originally ranged from calcium-saturated soils to highly acid soils. Originally the high calcium saturated soils, under cultivation, remained quite productive for a long time because of the soil's structure. Later as the soil's structure broke down, and it lost its humus, the calcium leached out very rapidly. It lost as much as 300 to 500 lb. of calcium per acre per year. The rate of application of limestone or calcium required to raise the soil pH one unit ranges from 900 lb. to the acre to 2000 lb. In still other soils, it takes as much as 4000 lb. to raise the pH one unit.

Dr. Albrecht closed the meeting, pointing out that 15 percent of our population today is employed on our farms, and probably this will not be increased very much in the future. Our over-all population is increasing daily, and if we are to provide enough food without increasing our farm population, we must certainly increase the productivity of the soils. A proper soil testing method will go a long way towards arriving at that goal.

New Gravel Plant

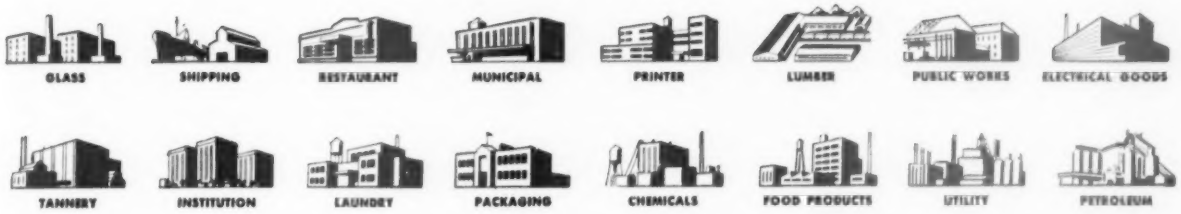
TRI-COUNTY GRAVEL CO., Mineral City, Ohio, opened its new plant at Sandyville, Ohio, for inspection recently. The company was host to 300 businessmen, state, county and township officials and others. The $150,000 plant has a capacity of 75 t.p.h. of gravel and in excess of 75 t.p.h. of sand. It can stockpile 20,000 tons of washed concrete sand in one complete pass through use of a new-type, self-propelled radial stacker.

Engineered by the Smith Engineering Works, the plant is largely of Telsmith and Barber-Greene equipment, using belt conveyors for intra-plant transportation. Gravel is crushed through a Telsmith primary jaw crusher and a 36-in. Gyrasphere crusher. Concrete sand is processed through a screw-type classifier and a drag-type classifier. The plant, which consists of three units, can be push button operated by one man. Two men are required to haul material.



TODAY...

We're all in the steel business!



FOR EACH OF US TO *GET* MORE STEEL . . . AND PRODUCTS MADE OF STEEL . . .
WE'VE GOT TO *PROVIDE* MORE SCRAP TO *MAKE* THE STEEL.

Half the melting stock used in the steel mill or iron foundry consists of iron and steel scrap. In normal times, enough scrap is produced by the mills, foundries, railroads, fabricators and scrap dealers to fill the need.

But now the mills have stepped up capacity to meet the greatly increased military and civilian demands for steel. And that increased capacity has outstepped the supply of scrap.

That is why we are calling on plants in both metal-working and NON-METAL-WORKING industries to provide the needed scrap NOW.

You have the heavy scrap needed to make more steel

Enough obsolete machinery, equipment and parts are being carried as useless inventory to give a big push to the production of steel. Surveys have proved this.

The trick is to get that old steel into the hands of the steel producers.

We're putting that job up to you.

To help maintain steel production... provide more steel for the equipment you want . . . turn in your idle iron and steel to your local scrap dealer.

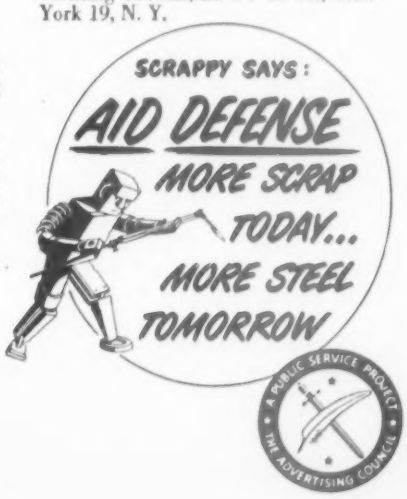
What you can do to help maintain steel production

1. Appoint one top official in your plant to take full responsibility for surveying the plant and getting out the scrap.

2. Consult with your local Scrap Mobilization Committee about its program to help out in the scrap crisis. For chairman's name, check with your Chamber of Commerce, or the nearest office of the National Production Authority, Department of Commerce.

3. Call in your local scrap dealer to help you work out a practical scrapping program. Non-ferrous scrap is needed, too.

4. Write for free booklet, "Top Management: Your Program For Emergency Scrap Recovery", addressing Advertising Council, 25 W. 45 St., New York 19, N. Y.



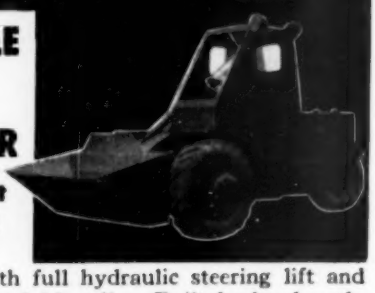
This advertisement is a contribution, in the national interest, by

ROCK PRODUCTS

introducing the...
"One Armed Bandit"
that pays off...

MODEL H SCOOPMOBILE
FULL HYDRAULIC
FRONT END LOADER

Shovel, Load and Transport
All Types of Bulk Material



The Model H SCOOPMOBILE with full hydraulic steering lift and bucket control is an outstanding material handler. Built for hard work, it gives top performance under all conditions. Planetary drive with 3-to-1 reduction ratio gives dependable power for all operations. Conveniently located finger-tip controls give the operator in cab full-vision command of every movement. Vickers hydraulic power steering gives positive control and lessens operator fatigue.

The versatile Model H SCOOPMOBILE with ¾ cu. yd. scoop has rated lifting capacity of 4,000 pounds and standard dumping height of 8 feet. Quick-change attachments include swivel-type concrete hopper, lift forks, special fertilizer or hay fork, and crane boom...and make the Model H SCOOPMOBILE an efficient multi-purpose unit.

EXTRA-LOW IN INITIAL COST... EXTRA-HIGH IN EFFICIENCY

Write for literature and name of your nearest Mixermobile dealer.

MIXERMOBILE DISTRIBUTORS

MIXERMOBILE • SCOOPMOBILE
STATIONARY MIXERS • DUO-WAY SCOOP

MIXERMOBILE

LIFT TRUCKS • TOWERMOBILE
TELESCOPIC LIFT • STATIONARY TOWER

Box 7527 • Portland 20, Oregon

Two-Stage Plant

(Continued from page 66)

One feature that is of special interest is the centrally located electrical control room. It is an elevated concrete block structure and in it are the G. E. and Square D controls. The building is so located that the operator can see all the operations of the screening and washing plant.

A second interesting feature is that the office and repair facilities are all housed in a roomy Quonset-roofed structure with walls of concrete block. Intermediate decks and ceilings are of Flexicore units made at the W. R. Bonsal Flexicore plant at Lilesville. Alongside the office is a Fairbanks-Morse truck scale. The head offices of W. R. Bonsal Co. are at 12 Front Street, Hamlet, N.C. W. R. Bonsal, Jr., is president of the company, F. J. Cloud is vice-president and general manager, and R. L. Ellerbe is secretary-treasurer.

Plant Maintenance Show

THE THIRD PLANT MAINTENANCE SHOW has been scheduled for the Public Auditorium in Cleveland, Ohio, January 19-22, 1953. The show, which developed from new management techniques in preventive maintenance, has grown to one of the nation's foremost industrial exhibits. Over 350 companies are expected to conduct exhibits. The Plant Maintenance Conference will be held jointly during the first three days.

Safety Records

ACCORDING TO THE NATIONAL SAFETY COUNCIL, the cement industry ranked third of the basic industries in 1951 with 4.22 disabling injuries per 1,000,000 man-hours, which was a drop of 13 percent. The frequency rate for the quarry industry dropped 16 percent to 15.40.

The accident severity rate for the quarry industry was 4.54 which was an increase of 127 percent and the figure for the cement industry was 1.84.

Geophysical Exploration

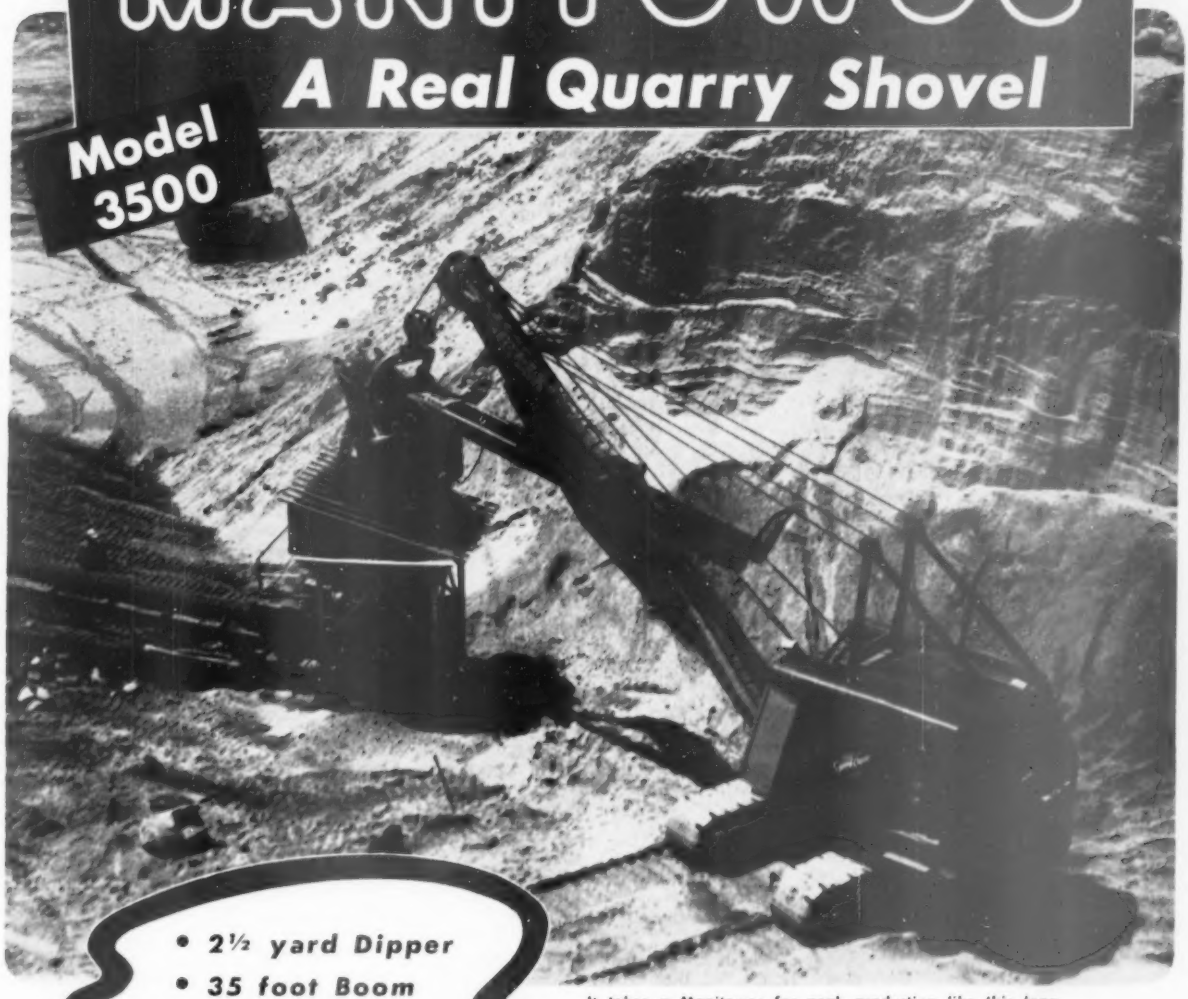
GEORATOR CORP., Arlington, Va., recently announced the formation of its Geophysical Exploration Division which will render engineering and exploration services in prospecting work, foundation, soil corrosion, well-logging and special electrical investigations.

The prospecting, foundation, and soil corrosion services will be under the supervision of E. R. Shepard, formerly in charge of Geophysical Foundation Exploration, Army Corps of Engineers, U. S. Bureau of Public Roads. The well-logging and electrical services will be under the supervision of S. Krasnow, chief development and research engineer, Geophysical Instrument Co., division of Georator Corp.

MANITOWOC

A Real Quarry Shovel

Model 3500



- 2½ yard Dipper
- 35 foot Boom
- 27 foot Sticks

It takes a Manitowoc for peak production like this long reach, high lift Model 3500 operating for Colonial Sand and Stone Co. of New York.

This Manitowoc 3500, operating for Colonial Sand & Stone Co. of New York, is a real producer, loading over 350 yards per hour from bank to hopper.

Its "hi-lift" 35′ boom, and long 27′ sticks enable it to reach out far and high, then swing over to the hopper, without frequent moving and traveling. The long boom also provides additional protection against slides, since the shovel can stay farther away from the bank. All these advantages without sacrifice of bucket capacity, account for more yardage with this Manitowoc.

There are many other exclusive Manitowoc features which put real money in your pocket—features such as fewer working parts, simpler design, more rugged construction, torque converter drive, fast operating cycles, simplified servicing and far easier operation.

Before you invest in any other crane, shovel or dragline, get complete details on the full line of Manitowocs. Manitowoc Engineering Corp., Manitowoc, Wis.

MANITOWOC Speed Crane

SHOVELS ½-5 YD. CRANES 18-100 TON

Rocky's Notes

(Continued from page 47)

is claimed, to impart water repellency to such materials as concrete. In a dry condition its chemical formula is given as (CH_3SiO_2Na). Its chemical name is sodium methyl siliconic acid. When water is added, the manufacturer says you get $[CH_3Si(OH)_2O]^-Na^+$.

Probably we have seen only the beginning in similar preparations which will keep water out of concrete, as well as require less mixing water. If, as we suspect, it is the retained water and the subsequently absorbed or adsorbed water that renders concrete and concrete aggregates subject to rapid deterioration, the use of some such silicone may answer the problem of durable concrete more effectively than attempts to further perfect cements.

Labor Relations Trends

(Continued from page 49)

ed with. The portion of the decision in that case which had extended the coverage of the Act to the quarry workers who prepared the rock for building the dike to protect the oil field from flooding was offset and avoided for the future by recommended amendment which became the Act of October 26, 1949, c. 736, Sec. 3 (j), 63 Stat. 911, 29 U.S.C.A. § 203 Pkt. Part."

The decision of the lower court, which in the present case was against the plaintiff (the employe, and in favor of the employer) was confirmed.

Bramhall Co. Case

This action was brought by the U.S. Secretary of Labor through the administrator of the F.L.S.A. to collect back wages and penalties against a quarry operator, who had won his case in the lower District Court, Western District of Missouri, the judge there stating: "It is my view, and I therefore conclude, that no portions of the said materials were moving in commerce, and that the defendants were not producing goods for commerce, and for that reason, the employes of the defendant are not covered by the Act, and the plaintiff's complaint is dismissed." It was an appeal from this decision by the Government that brought the case before the Circuit Court of Appeals.

The facts in the case were not disputed and they are similar to those in many such instances. The crushed stone producer operated plants at Gilliam, King City and Regal, with offices at Carrollton, Mo. The products were sold to others who used them for a variety of construction purposes, including the maintenance and repair of highways, concrete bridges, dikes and revetments for river navigation, etc. None of the quarry company employes had anything to do with placing the crushed stone in structures. In the language of the court's decision:

"Admittedly, defendants violated the Act as charged, in that their record-keeping was not in accord with the Act and their employes worked hours in excess of 40 hr. per week without receiving the statutory overtime compensation if their employes are within the coverage of the Act.

"Defendants state the question for decision here and their position with respect to it as follows: 'The production of crushed rock within a State, sold entirely within that State, and used by the purchaser entirely within that State for the maintenance and improvement of roads and a river over which interstate commerce moves, is not the production of goods for commerce within the meaning of the Fair Labor Standards Act of 1938, as amended.'

"Plaintiff does not contend, as he could not do so in view of the decided cases, that defendants' employes are 'engaged in commerce,' but only that they are 'engaged in the production of goods for commerce.' The provision of the Act sought to be applied here by the plaintiff is more flexible and encompasses more activities than could be included by the phrase 'engaged in commerce.'

* * * * * *

"It has been established that the repair of interstate facilities constitutes commerce within the meaning of the term as used in the Fair Labor Standards Act, and employes working on and maintaining roads and bridges carrying interstate traffic, dikes on the Mississippi River, telephone conduits containing circuits carrying interstate calls, and railroad signal towers, have been held to be engaged 'in commerce.'

* * * * * *

"In the case at bar, plaintiff Secretary of Labor advances to the next logical step and contends that since the persons working on interstate roads are working on instrumentalities of interstate commerce and are engaged 'in commerce,' then the persons producing the goods used in working on the said instrumentalities are themselves producing 'goods necessary for commerce.'

"We have been referred to only one case decided by a Federal Appellate Court passing on the precise question. In the case of Tobin, Secretary, vs. Alstate Construction Company, 195 F.2d 577, the Court of Appeals for the Third Circuit held under practically identical circumstances that 'Alstate's off-the-road employes, in producing material which is used to repair and maintain the surfaces of instrumentalities of commerce, are engaged "in the production of goods for commerce."' With that declaration we are in accord.

"In defendants' arguments in this court, and the reasoning of the trial court, great stress is laid on the fact that in the case at bar, the goods produced did not *move* in interstate commerce and that therefore employes engaged in producing those goods are not producing goods for commerce. Movement, or the lack of it, of the article produced across state lines is not the determining factor."

* * * * * *

Employer Loses

"We feel that the production of material designed to be placed upon interstate highways and upon structures in rivers carrying interstate commerce must be held to be production of 'articles of commerce.' We recognize that Congress in enacting the Fair Labor Standards Act did not extend the coverage of the Act as far as they might have in that they expressly refused to approve a statute regulating industries 'affecting commerce.' It appears, however, that the production in this case does more than merely 'affect commerce.' When it is held, as it was in the case of Overstreet vs. North Shore Corp., supra, that roads 'used by persons and goods passing between the various States' are 'instrumentalities of commerce,' and that the persons employed in maintaining such roads are engaged 'in commerce,' then it seems clear that goods, produced for instrumentalities of commerce and applied by persons engaged in commerce, have been produced 'for commerce.'

"This seems all the more reasonable when considered in the light of the U.S. Supreme Court's declaration in the case of Armour & Co. vs. Wantock, supra, that the phrase 'produced for commerce' is 'obviously' more flexible and more inclusive than the phrase 'engaged in commerce,' and in the light of the purpose of the Act itself.

"As stated in Phillips Co. vs. Walling, 324 U.S. 490, 493, the Fair Labor Standards Act was designed 'to extend the frontiers of social progress' by 'insuring to all our able-bodied working men and women a fair day's pay for a fair day's work.' In that same case, in discussing an exemption in the Act, the Supreme Court continues, 'Any exemption from such humanitarian and remedial legislation must therefore be narrowly construed, giving due regard to the plain meaning of statutory language and the intent of Congress.'

"It appears to us that the production in this case must be held to be within the coverage of the Act, and therefore the judgment of the trial court must be reversed.

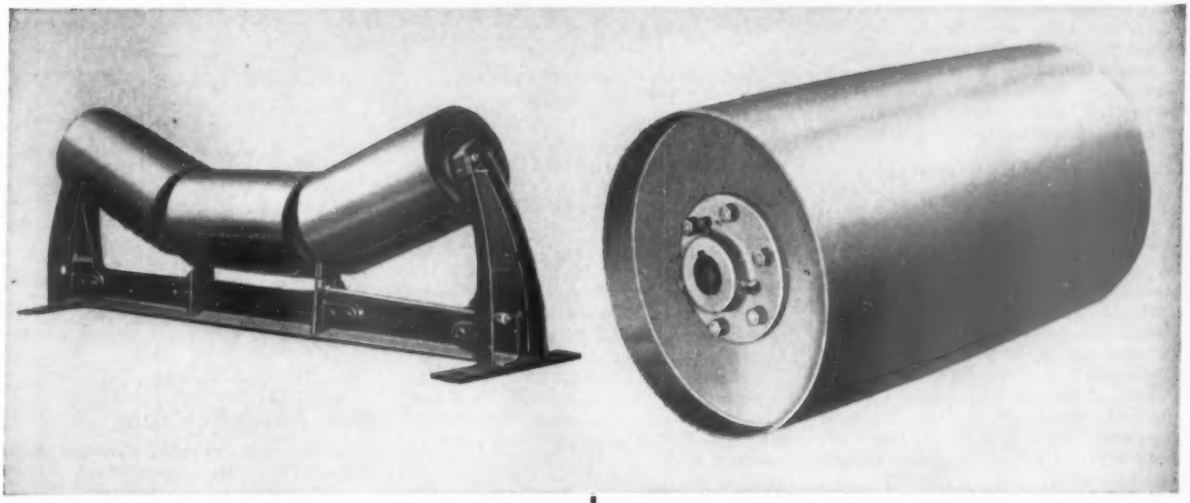
"Reversed and remanded with direction to enter injunctional order as required by this opinion."

Thus we have two diametrically opposite decisions on the same issue, one by a State Supreme Court, one by a U.S. Circuit Court of Appeals. Let us all hope that we can elect a Congress that will straighten out this issue.

●

CUERO SAND AND GRAVEL CO., Cuero, Texas, has been sold to C. C. Palmer Construction Co., also of Cuero.

How Belt Conveyors by LINK-BELT
cut your handling costs



LINK-BELT Idlers require minimum lubrication and adjustment

BY MINIMIZING maintenance . . . holding "down-time" to a new low . . . reducing power requirements — Link-Belt Roller Bearing Idlers save you money.

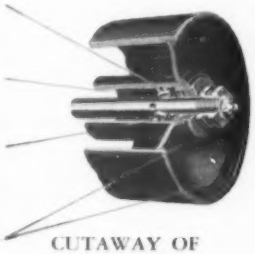
And, because of standardized design, Link-Belt gives you the famous "100" Idler or the heavy-duty "200" Idler at a cost lower than you'd expect. You can choose from the full Link-Belt line of troughing, impact-cushioning, belt training and flat belt idlers in a wide range of roll diameters and belt widths. A complete line to meet any requirement.

Grease-in dirt-out, cartridge type unit seal preserves lubricant. No springs, no loose parts, no sliding metal-to-metal contact.

Large grease reservoir prolongs lubrication intervals.

Precision roller bearings maintain alignment.

Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.



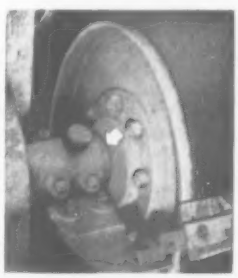
CUTAWAY OF "100" ROLL

LINK-BELT Welded Steel Pulleys minimize shaft deflection

MODERN Link-Belt welded steel design gives you lower maintenance and longer pulley life in more ways than one. Water- and dust-tight construction preserves balance, halts corrosion. Removable hubs — key-seated in line with two set-screws — are interchangeable with many other shaft sizes.

And for reducing shaft deflection (see below), you can't possibly get better protection than with Link-Belt Welded Steel Pulleys.

Since shaft bending moment increases in proportion to the distance between shaft bearing and pulley hub, it's easy to see why Link-Belt Welded Steel Pulleys are your best bet. Note how the bearing support and hub of the pulley are mounted with medium clearance. That's possible because Link-Belt hubs are flush with the pulley face.



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12.934

LINK-BELT

Glass Sand

(Continued from page 87)

It is only the small dusts which reach the lungs where they are absorbed, thus penetrating into the organism.

These small dusts have special physical properties; they disperse in the air where they seem to be able to dissolve in the same way as a particle of sugar dissolves in water. In this way they form what are termed "aerosols," whose study is assuming increased importance in medicine.

Nature of Dust-Aerosol Formations

The particles of the aerosols practically cease to obey the laws of gravity and can float about for hours, transported to other locations by air currents. As an example of the small size of the aerosols, 1000 particles of 1μ diameter weigh no more than a single particle of 10μ diameter.

For all the above reasons, the fine particles constitute by far the most dangerous element of dusts; this holds good especially for silica dust dispersions.

A mask for use against aerosols can be tested with particles of methylene blue approximately the same size as silica particles. While effectively arresting the passage of dust into the nose or mouth, the mask should not impede vision unduly, should be easy to fix on the face, should stay in place while in use without undue movement, and should not unduly affect the respiratory effort.

The importance of the size of the particles can best be illustrated as follows. In a given atmosphere, 1 kg. of dusts whose particle size exceeds 5μ can make the working conditions uncomfortable, but will not be harmful. But if in the same quantity of atmosphere there are present only 10 gm. of dust of 0.1μ particle size, these can penetrate deep into the lung passages and cause silicosis. In Fig. 5 is shown the dispersion curve of an aerosol; normally the average diameter is 0.5μ. Such an aerosol is a dispersion of a body of colloidal dimensions, solid or liquid, in air. Aerosols possess the following characteristics: directed as a fog against a mirror, they do not cloud it; they remain in suspension in the air for a very long time; the particles have an electrical charge; they always retain their spherical shape and can agglutinate without mixing. They can pass, as can a gas, through a liquid film of appreciable thickness.

The fact that these aerosol dust dispersions carry an electrical charge makes possible a means of dealing with dusty atmospheres embodying dispersions of fine dust particles. The method comprises the employment of a medium just like that which it is desired to combat, i.e., the use of aerosol dispersions. If a suitable quantity of such a prepared aerosol is projected into a space

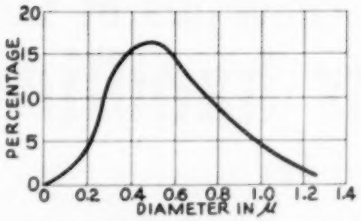

Fig. 5: Dispersion curve of an aerosol

containing fine dust particles, the electrical attraction causes the formation of small aggregate complexes of dust-aerosol. The effectiveness of these aerosol dispersions is remarkable.

As a test, some rabbits and rats were placed in a chamber where 45 mg. per cu.m. of pure silica was present in the atmosphere as fine particles. A second group of test animals was placed in an atmosphere containing a mixture of the same amount and type of silica plus aerosol. The test was conducted for 6 hr. per day, 5 days per week, for a period of 17 months. At the end of a few days, silica appeared in the lungs of the silica-exposed animals. After 103 days, silicosis symptoms appeared. In the aerosol-treated atmosphere, no silicosis symptoms could be discovered. The same results were obtained at the end of 145 days, 315 days, and more.

Nature of Silicosis

W. A. Weyl[12] has theorized that the formation of active oxygen at the surface of silica and clay is a possible cause of silicosis attack. Silica and some silicates can, when aspirated, cause lung infections which are clearly different from other nonspecific cases of pneumoconiosis. Silica and clay dusts would appear to exert a specific toxic action, which is somewhat astonishing since silica is insoluble. Actually, the soluble silicates and hydrated silica gel do not produce silicosis. They can enter into the metabolism of plants and animals without causing any toxicity.

Recently discovered is that the surface of silica particles exercises a strong oxidizing effect, comparable to that of ozone. This effect is very great for quartz dusts, silica gel, clay or other silicates which have been freshly ground, and it persists even in the presence of moisture. The oxidizing effect of SiO_2 is increased by light and higher temperatures and is proportional to the surface area. The quantity of oxygen involved ic very small and its detection necessitates very sensitive methods. The oxidation potential, however, is very high since it is possible to oxidize silver in this way.

Attention is drawn to this, because it provides a plausible explanation not only of the specific toxicity of dusts of silica and clay in the lungs, but also of aluminotherapy. Metallic aluminum powder, a reducing agent, has been found to combat the toxicity of silica dust and thus prevent silicosis.

Some tests were made which clearly showed the oxidizing effects of the surface of silica or silicate particles, and their analogy with ozone; there is clearly involved an oxidation by atomic oxygen and not by electron transfer.

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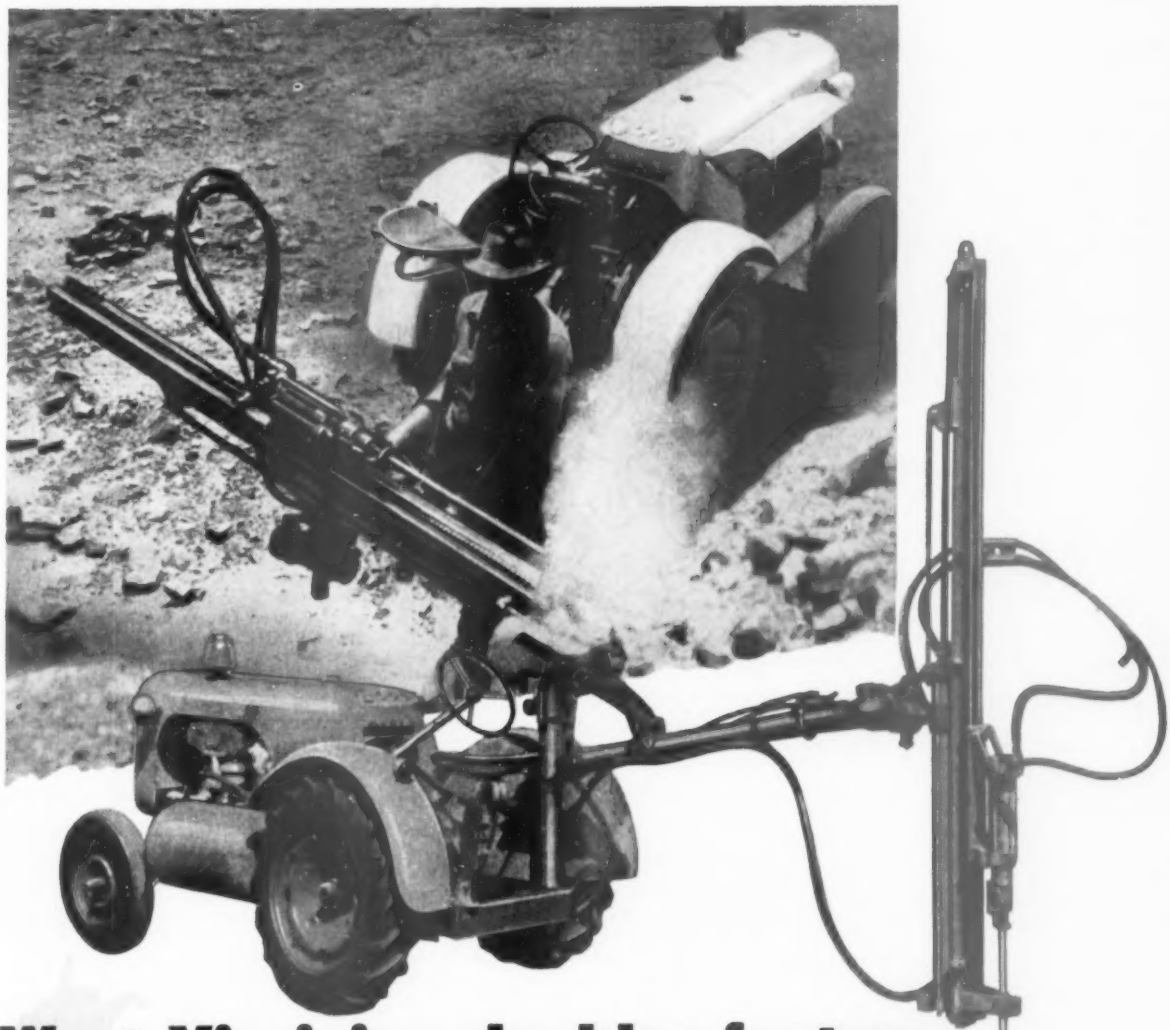
New Jersey Feldspar

New Jersey's Potential Feldspar Resources. Part II. Mineral Technology and Economic Evaluation by William Lodding. Bulletin No. 5 of the Rutgers University Bureau of Mineral Research, Rutgers University Press, New Brunswick, N.J., 1951, $1.50

PART I of *New Jersey's Potential Feldspar Resources* covered some of the promising feldspar deposits in the state. Part II describes the investigations made of the samples of granites and pegmatites collected from ten localities, the object of which was to determine which deposits might yield marketable grades of feldspar. All tests were on a laboratory scale but utilized methods which commercial quarries could duplicate economically.

New Jersey, though one of the principal consumers of feldspar in the country, formerly could not compete with feldspar produced in North Carolina, New Hampshire, Canada and other places. This was because the state lacked deposits of coarse gravel pegmatites considered the most desirable source of feldspar. As these deposits have become depleted in other states and mineral dressing methods have had to be resorted to on the lower grade deposits, New Jersey feldspar sources can now be worked economically, especially in view of the present high railroad rates.

This bulletin describes the research work done by the Bureau of Mineral Research to determine the best treatment for the various pegmatites and granites. Three types of impurities occur in the New Jersey deposits: iron-bearing minerals, iron oxides and silicates containing iron; quartz; and lime. The methods employed to remove these impurities are covered in detail. Detailed results of the tests made on samples from the ten localities considered promising are included in the New Jersey report.



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T-22

"Prospective" Chemistry

(Continued from page 73)

stuffing of more CaO into the structure between the chains could be explained. Fig. 11 illustrates how a trigonal ring could be opened up to form a single chain of Si tetrahedra, thus providing more available space into which CaO or Ca and O ions could be packed. This is the kind of structure of the pyroxene minerals, so there is an analogy—the "pyro" meaning the silicate mineral is presumed to have had a fiery origin.

Mineral Stability

Wollastonite, $CaSiO_3$, and the artificial monocalcium silicate of cement chemistry, $CaO{\cdot}SiO_2$, is a stable organization or coordination of the ions of Si, Ca and O. In the terms of cement chemistry it has no "hydraulic" properties; it gives no reaction or hydration with water. According to geochemists, the prime requisite of a stable mineral organization is that the ions shall be so coordinated as to have a minimum of free energy. This energy is expended in rearranging the packing of the O ions, and in shifting distances between the positively charged cations (the Ca, Si, etc.) and their coordinated O anions. Also, energy is absorbed when one or the other ingredient enters into "solid solution" with the other.

The term "solid solution" appears often in discussions of cement research, and the whole theory of phase relationships of molten minerals is based on solid solutions of one mineral or mineral combination in another. What then is a solid solution, since it appears to be so important in discussions of the nature of portland cement clinker? According to Rankama's and Sahama's "Geochemistry," reviewed in ROCK PRODUCTS, February, 1951, "the term solid solution states nothing about the structural manner of occurrence of the solute in the solvent. Consequently, two structurally different kinds of solid solutions may be distinguished: (1) the solute is completely beyond the structural framework of the solvent and does not participate in its binding; (2) the solute forms a complete isomorphic series with the solvent."

Probably we should define "isomorphic." It means that the ions that are dissolved in the solid solution are of such size and valency that they can take the place of the ions in the solvent without any change in the framework or lattices. Thus iron Fe^{+2} frequently substitutes for Mg^{+2} in mineral organizations or compositions. So, when it is said that the extra lime in $2CaO{\cdot}SiO_2$ or $3CaO{\cdot}SiO_2$ may be in solid solution in $CaO{\cdot}SiO_2$, it does not tell us anything about the actual structure of the di- and tricalcium silicates of portland cement.

In Paper No. 49 of the Portland Cement Association Fellowship at the National Bureau of Standards on

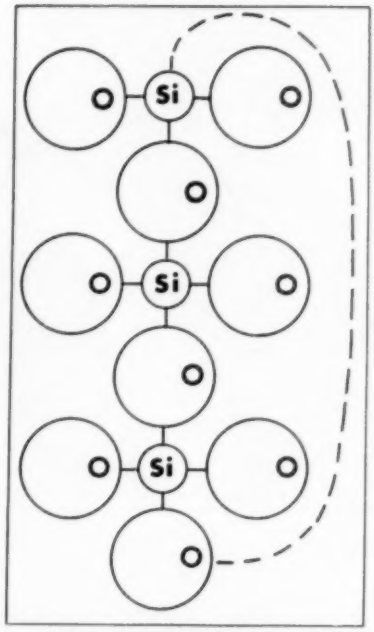

Fig. 11: Continuous single chain of silica tetrahedra formed by breaking trigonal rings

"Some Recent Advances in Our Understanding of the Chemistry of Portland Cement" by Dr. Robert H. Bogue, he reviews some work by M. A. Bredig on the structure of dicalcium silicate, $2CaO{\cdot}SiO_2$. Dr. Bogue says that Bredig contends that at low heat contents the weaker Ca cation [it has a positive charge of only two against four for silicon] may approach the SiO_2 radical [that is SiO_2 as an ion by itself] close enough to exert increased attraction upon the electron shell of the O ions [that belong to the Si tetrahedra], and be able thereby to repulse the Si ions. Dr. Bogue continues that Bredig argues from this reaction, if the coordination number of Ca for O in γ C_2S [the kind of dicalcium silicate that disintegrates to dust when cement clinker is slowly cooled] is 6, as there is reason to believe, the coordination number will increase in the polymorphic forms stable at higher temperatures. [Polymorphic forms of lime means Ca with different O coordinations—different lattices for the same material.] He places the value of the coordination number in the α form of $2CaO{\cdot}SiO_2$ at about 10, and in the β form at an intermediate value, probably 8. [It is the β form that is contained in hydraulic cements.]

Since Ca is known to have a coordination number of 8 in many natural minerals, other than in pure calcium silicates, that is, where other ions are present to help absorb the excess negative valences, it would seem plausible that under special conditions which Bredig describes, Ca with an 8-coordination could exist temporarily at high heats in $2CaO{\cdot}SiO_2$. In this case it would appear that the CaO has built up free energy at the expense of the silica tetrahedra, and the mineral combination is unstable. Presumably, a geochemist could figure out the excess of free energy available in such an unstable combination.

Dr. Bogue, in the paper referred to, continues his discussion of Bredig's work as follows: Bredig points out that in $Ca(OH)_2$ or hydrated lime, the Ca ion establishes around itself a shell of 6 oxygen ions. In γ C_2S, where the shell already consists of CaO_6, there is no potential to afford the chemical exchange in reaction with water. Hence, γC_2S is unreactive toward water. But in the βC_2S, the tendency to revert to CaO_6 may be so great that the change in free energy may account for the activation energy of interaction with water.

According to our understanding, that would mean that when the unstable βC_2S is exposed to water the hydrogen ions would release the temporary grip that the Ca ions have on the extra two O ions, substituting instead (OH) ions. The expansion resulting from this absorption of water would then constitute the "hydration" of the C_2S, releasing the SiO_4 tetrahedra as such, probably in chains, to be recombined in a hydrous form with the $Ca(OH)_2$. This was the same theory, rather crudely expressed, in a previous discussion of ours, in which we attempted to explain that the hydration of the C_2S and C_3S was really only a hydration of the contained lime. That theory was universally objected to because it was thought to imply "free lime" in the clinker, which of course is taboo. Apparently, however, the CaO in excess of that required for $CaO{\cdot}SiO_2$ is so combined in C_2S and C_3S that it still reacts like CaO in the presence of water. It appears that no work has yet been published on the structure C_3S.

(To be continued)

●

Correction

AN ITEM published in the July, 1952, issue of ROCK PRODUCTS, page 48, pertaining to the new kiln recently placed in operation by Dragon Cement Co. at its Thomaston, Maine, plant, stated that the two kilns now in operation have a combined capacity of 900,000 bbl. of cement annually. This should have read that each kiln has a 900,000 bbl. capacity.

Canadian Cement

CANADIAN CEMENT PRODUCTION in 1951 amounted to 17,007,812 bbl., valued at $40,446,288, setting a new high production record. In 1950, production totaled 16,741,826 bbl., valued at $35,894,124. Gains have been registered for each postwar year, with last year's shipments more than doubling the 8,471,679 bbl. produced in 1945.

Here are ways you can help him deliver the goods in the coming election

This worker's future—and yours—depends on how well he understands the importance of his vote and the importance of voting wisely. Too many of us fail to vote, to choose our leaders wisely, to guide them *in the direction we want to go.* You can help workers in your own business vote effectively by showing them how their votes, intelligently cast, can build a better America.

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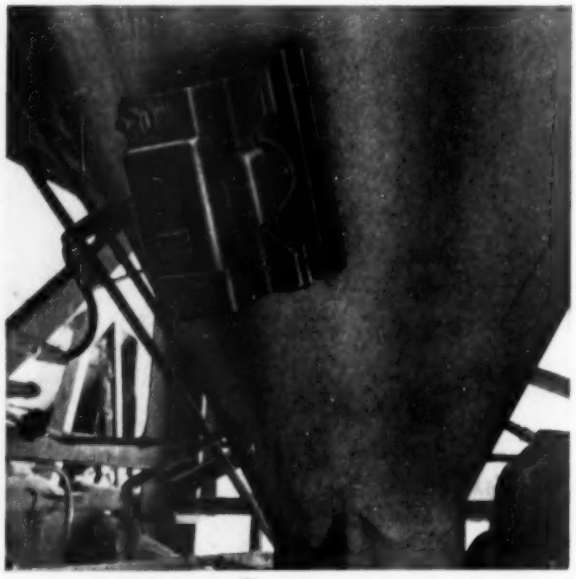

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Hercules Cement Corp.—Q	0.25	Oct. 1
Pacific Coast Aggregates—pf.—Q	1.12½	July 15
Peerless Cement Corp.—sp.	0.12½	Sept. 12
Peerless Cement Corp.	0.25	Sept. 12
Riverside Cement Co.—cl.A—Ac	0.50	Aug. 15
Standard Silica Corp.—Q	0.12½	Aug. 15
Whitehall Cement Mfg. Co.—Q	1.00	Sept. 30

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has reported its consolidated earnings, for the six months ended June 30, as follows:

	1952	1951
Net sales	$12,262,541	$10,003,984
Other revenue	678,771	698,627
Total	12,941,312	10,702,611
Cost of sales, etc.	7,793,711	6,323,133
Selling, etc. exp.	1,351,700	1,146,520
Other exp.	41,724	145,015
Net earn.	3,754,177	3,087,943
Interest	150,018	117,967
Income taxes	1,782,970	1,417,267
Net profit	1,821,188	1,552,709
Earn., pfd. share	$11.29	$9.56
Earn., com. share	$2.03	$1.81
No. of pfd. shares	161,250	162,475
No. of com. shares	850,000	800,000

PENN-DIXIE CEMENT CORP., New York, N.Y., for the three months ended June 30, reports its consolidated earnings as follows:

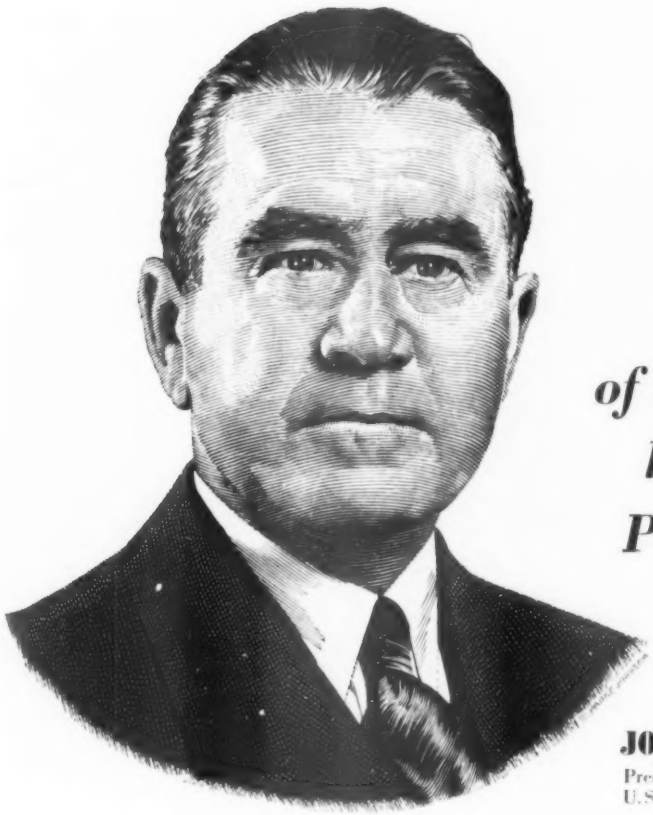
	1952	1951
Net sales	$6,492,243	$7,137,180
Cost and exp.	4,717,502	4,707,988
Deprec. & deplet.	263,480	204,497
Operating profit	1,511,261	2,224,695
Other income, net	54,086	46,648
Total income	1,565,347	2,271,343
Interest	25,104	9,390
Income & prof. tax	879,500	1,365,000
Net profit	660,743	896,953
Earned com. share	$1.10	$1.49
No. of com. shares	602,136	602,136

BASIC REFRACTORIES, INC., Cleveland, Ohio, for the first quarter of 1952, reported a net profit of $144,981, or $0.27 per common share, on 489,475 shares. Net profit for the same quarter in 1951 amounted to $2,767,026, or $0.24 per share. Net sales for the 1952 period totaled $3,149,230, compared with $2,767,026 for the same quarter in 1951.

CONSOLIDATED CEMENT CORP., Chicago, Ill., reports a net loss of $243,600 for the first quarter of 1952, as against a net loss of $41,200 for the first quarter of 1951. Net sales for the 1952 period amounted to $599,300, compared with $699,300 for the same period of 1951.

NATIONAL GYPSUM CO., Buffalo, N.Y., for the six months ended June 30, 1952, reports a net profit of $3,491,622, or $1.39 per common share, compared with a net profit of $3,046,518, or $1.71 per share for the first six months in 1951. Sales for the 1952 period amounted to $46,366,499, as against $45,503,007 for the same six months of the preceding year.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., has reported a net profit of $912,445, or $1.29 per common share, on 643,720 shares, for the first six months of 1952. This compares with a net profit of $682,463, or $0.94 per share, for the corresponding period of 1951.



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JOHN E. GOBLE
President, National Tube Division,
U.S. Steel Corporation

"We of the National Tube Division of the United States Steel, recognize that systematic saving through the Payroll Deduction Plan is an investment in the security of the Nation, as well as of the individual. We are proud of the participation resulting from a person-to-person canvass in our plants and offices. More than 98% of our 27,000 employees have enrolled in the Payroll Savings Plan—a complete affirmation of their faith in America. Such personal savings are the backbone of our free enterprise system."

Concisely, clearly, Mr. Goble cites three of the reasons why 98% of the 27,000 employees of National Tube are enrolled in the Payroll Savings Plan:

- recognition by management that the Payroll Savings Plan contributes "to the security of the Nation as well as of the individual."
- the purchase of Defense Bonds through payroll deductions is concrete affirmation of Americans' faith in America.
- a person-to-person canvass in plants and offices put a Payroll Savings application in the hands of every National Tube employee.

There is still another reason for National Tube's outstanding employee participation: *Mr. Goble's personal interest in the Payroll Savings Plan, and the conducting of the person-to-person canvass.*

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If you are the man who makes the top decisions in your company, ask today for a report of *your* Payroll Savings Plan, particularly, the percentage of participation. Then, call a meeting of your associates. Show them this statement of Mr. Goble's. Tell them you are going "all out" to put your company (large or small) in the front rank of those who can be justly proud of their Payroll Savings Plan.

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DRAGON CEMENT CO., Thomaston, Maine, for the years ended June 30, has listed its earnings as follows:

	1952	1951
Net sales	$9,138,322	$9,075,400
Net before tax	1,932,738	2,168,053
Federal income tax	974,000	1,001,000
Excess profits tax	242,000	240,000
Net profit	716,738	927,053
Earn. per share	$4.21	$4.12
No. of shares	170,123	225,000

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, for the six months ended June 30, 1952, lists a net income of $508,790, or $1.02 per common share, on 499,160 shares, compared with a net income of $534,370, or $1.07 per share, for the first six months of the preceding year.

CERTAIN-TEED PRODUCTS CORP., Ardmore, Penn., for the six months ended June 30, 1952, reported a net profit of $1,626,225, or $1.00 per common share on 1,623,879 shares, compared with a net profit of $2,554,431, or $1.57 per common share, on 1,623,829 shares, for the corresponding six months of 1951. Net sales totaled $27,098,149 for the first six months of 1952, as against $33,140,798 for the same six months of the previous year.

ALBERENE STONE CORP. OF VIRGINIA, Schuyler, Va., reports a net loss of $28,079, or $0.43 per share, on 65,745 shares, for the six months ended June 30, 1952. This compares with a net profit of $35,229, or $0.54 per share, for the first six months of 1951. Net sales amounted to $139,380 for the 1952 period, compared to $168,986 for the same six months in 1951.

NEW ENGLAND LIME CO., Adams, Mass., lists a net profit of $61,019, or $0.88 per common share, on 69,622 shares, for the six months ended June 30, 1952. This compares with a net profit of $135,225, or $1.94 per common share for the same period in 1951. Net sales in the 1952 period totaled $914,757, compared with $1,061,498 for the 1951 period.

AMERICAN POTASH & CHEMICAL CORP., Los Angeles, Calif., for the six months ended June 30, reports the following consolidated earnings:

	1952	1951
Net sales	$8,604,046	$9,357,523
Cost of sales	6,795,138	7,289,914
Selling, etc. exp.	566,324	510,641
Oper. profit	1,242,584	1,556,968
R.R. net income	178,046	249,192
Total income	1,420,630	1,806,160
Other deduct., net	135,470	134,742
Federal income tax	344,400	465,500
State income tax	24,100	32,000
Net profit	916,660	1,173,918
Pfd. div. require	127,200	128,900
Balance	789,460	1,045,018
Earn., pfd. share	$14.41	$17.84
Earn., A & B share	$1.49	$1.98
No. of pfd. shares	63,600	65,800
No. of A & B shares	528,390	528,390

NAZARETH CEMENT CO., Nazareth, Penn., lists a net profit of $80,942 for the six months ended June 30, 1952, compared with a net profit of $257,406, for the first six months of 1951. This amounted to $0.52 per common share on 154,749 shares, for the 1952 period, and $1.66 per common share for the 1951 period.

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___Bagging Machines
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___Batchers
___Belting, Conveyor, Elevator, Power Transmission
___Belting, V-Type
___Belt Repair Equipment
___Bin Level Indicators
___Bins and Batching Equipment
___Blasting Supplies
___Block Machines Concrete Building
___Bodies, Trailer
___Brick Machines and Molds
___Buckets
___Bulldozers
___Cars, Industrial
___Classifiers
___Clutches
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___Concrete Mixers
___Concrete Mixing Plants
___Concrete Specialty Molds
___Concrete Waterproofing and Dampproofing
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___Diesel Engines
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___Dredge Pumps
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___Wire Rope

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Employe Safety Achievement

AFTER SPENDING 45 of his 50 working years in mills of the cement industry, Seele Blowers of Southwestern Portland Cement Co., Fairborn, Ohio, retired with one of the finest personal records in cement history—45 years of safety, with not a single lost-time accident to mar the story of those years of service. Also, he was never involved in an accident affecting a fellow workman.

In June, 1902, as a boy of 16, Seele Blowers started work in the packhouse of Wabash Cement Co., Stroh, Ind. That fall, he was transferred to the finish grind mills where he received his first lesson in safety.

"My foreman gave me some general instructions," said Mr. Blowers, "and then before he left me alone he said, 'If you see anything going to pieces, see if you can fix it; if you can't, get away from it. We can repair mills, but we can't repair men'".

During the following years, Mr. Blowers worked for Burt Portland Cement Co., Bellevue, Mich.; Wolverine Portland Cement Co., Coldwater, Mich.; Medusa Cement Co., Dixon, Ill.; Chicago Portland Cement Co., LaSalle, Ill.; Chanute Portland Cement Co., Chanute, Kan.; then again for Wabash Cement Co. at Stroh, Ind., and Fairborn, Ohio. Since 1928, he has been with Southwestern Portland Cement Co.

His experience, besides the packhouse, covers mill grinding, kiln burning, repair crews, and general operating, so he has quite evidently been exposed to all of the hazards that have existed at some time in the average cement mill.

When interviewed about his experiences, he was asked about safety guards and equipment in the early years, to which he replied, "There were practically none. I have seen screw conveyors running open for months at a time and gears without covers. There were transmission rope drives, line shafts, chain and belt drives, all without guards. There were no dust collecting systems in those days and you could hardly see across the mill room. Steam dynamos generated electricity for lights at night, but since these were not operated in daytime, we used kerosene oil torches in the darker places."

As to the most frequent types of accidents, Mr. Blowers felt that screw conveyor mishaps were chief among the more serious and were more frequent. Falls were another source, and here he mentioned that ladders had to be used to get to the tops of bins and that stairways were frequently without railings.

When questioned about the average foreman's attitude toward safety during the early years, he replied, "The average foreman was more of the driving type whose chief thought was to get the job done, and little or no time was given to doing it in the safest way. Neither foremen nor men gave much thought to it beyond ordinary caution. Today there is very little driving and much more attention is given to doing a job in the safest way possible."

Seele Blowers

To him the first great progress in accident prevention effort became strongly evident in the early twenties. "The use of dust collectors and the cement pump made a vast improvement in visibility and housekeeping. First aid and safety committees helped a lot. Hazards from belts and gears, conveyors and starting equipment are practically gone."

Mr. Blowers, who is justly proud of his safety and service experience, has a philosophy which has been his guide through many years—"I have always been able to keep my head, take it easy and not take any chances. From the first I have always tried to work out the safest and best way to do a job before I started it, and it usually came out right." After finishing his story of his experience, he added one more thought which expresses the sentiments of cement men throughout the industry. "Working around a cement mill is something like railroad work. You might get away from it for a while, but sooner or later you come back to it. It has a fascination all of its own."

Florida Cement Consumption

CEMENT CONSUMPTION in Florida in 1951 totaled 5,864,000 bbl., or 17 percent above that of 1950 and 29 percent above the amount consumed in 1949, according to a Florida Chamber of Commerce report. Increases in cement consumption paralleled the accelerated building program in Florida. In 1951, the value of all types of private and public building and highway construction totaled $806,700,000, which was 16 percent above the 1950 figure and 36 percent above the total of 1949.

National cement consumption in 1951 was reported to be 6 percent higher than in 1950 and 18 percent higher than in 1949.

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DIESEL POWER
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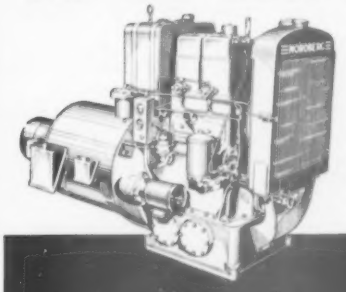

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The 4FS series incorporates the same high standards of design, construction and performance that have been identified with world-famous Nordberg Diesels for over 35 years. For electric power, for pumping, for energizing lifting magnets, and for scores of straight power applications . . . you just can't beat the reliability, low operating cost and minimum maintenance offered through the use of Nordberg 4FS Diesels.

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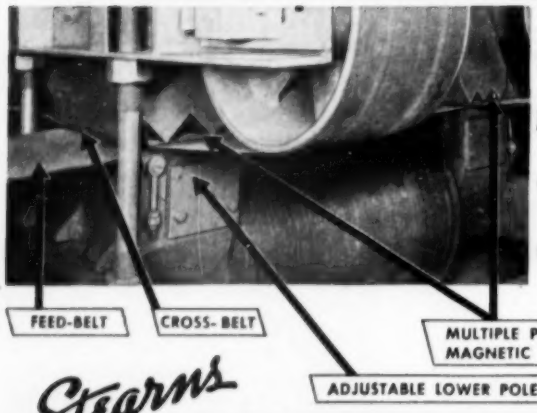

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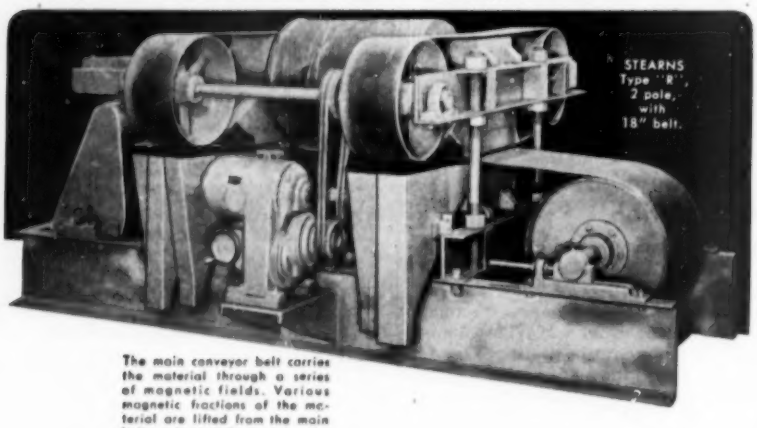
Utilizing the time-tested lift method of magnetic separation, the STEARNS Type "R" Separator has been re-designed to provide additional and improved separations of magnetically reluctant ores and minerals at a lower total cost. These results have been achieved mainly through a multiple point adjustable pole construction* which will give up to four different and distinct magnetic products at each pole. Thus, fewer magnet assemblies are required and therefore the initial and operating costs are reduced.

Having multiple magnetizing zones of increasing intensity in a single field not only provides (1) the time necessary to overcome the magnetic reluctance, but (2) also provides for a self-induced magnetizing effect on the ores and minerals as they pass from zone to zone of increasing magnetic intensity.

By adjusting the angle of the lower pole it is possible in most applications to use a single magnet separator having as many or more separating zones as would ordinarily be found in a separator having a multiple of magnetic fields. Write for complete descriptive literature on STEARNS Separators for mining applications.



The main conveyor belt carries the material through a series of magnetic fields. Various magnetic fractions of the material are lifted from the main belt and carried away by the cross belt assemblies.

Foremost in the Magnetic Field

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MANUFACTURERS NEWS

Pioneer Engineering Works, Minneapolis, Minn., has received an additional $5,000,000 government Defense Department contract to furnish 14 portable aggregate crushing, screening and washing plants, including maintenance and repair.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has acquired the plant and remaining assets of Victor Electric Products, Inc., Cincinnati, Ohio, manufacturer of small motors. The plant has been made a part of the Norwood works and includes sales, engineering and manufacturing facilities of the Texrope drive section formerly carried on at the West Allis works.

The Frank G. Hough Co., Libertyville, Ill., announces the appointment of Dan Daily as district representative in North and South Dakota, Minnesota, Iowa, Wisconsin and upper Michigan, with headquarters in Minneapolis. Dick Lewis has been named district representative for western Missouri, Wyoming, Nebraska, Kansas and Colorado, with headquarters in Kansas City, Mo. Both Mr. Daily and Mr. Lewis replace Jim Suter who has become associated with the Cornhusker Tractor & Equipment Co., Hough distributor, North Platte, Neb.

Robert G. Evans Co., Kansas City, Mo., has been formed by Robert G. Evans, former vice-president and one of the original founders of the Clipper Mfg. Co., to distribute masonry and concrete saws, which will be marketed under the trade name "Target." Mr. Evans has long been a nationally recognized authority in the field of diamond blades research and development and all types of cutting equipment and machinery. A new color system of identifying blade specifications has been introduced by Mr. Evans—gold blades for hard materials, blue blades for medium, and red blades for soft or abrasive products.

E. I. du Pont de Nemours & Co., Wilmington, Del., announces the death of Lammot du Pont, formerly president of the company and youngest of the three brothers. He was 71 years old and had been president from 1926 to 1940, when he resigned to succeed his brother, Pierre, as chairman of the board, from which he retired in 1948.

Air Reduction Co., Inc., New York, N.Y., announces the appointment of G. T. Van Alstyne as director of advertising and publicity. George M. Worden, recently with Hill & Knowlton, Inc., public relations counsel, has rejoined the company as assistant to the director. A. V. Scherer, formerly advertising manager of the Ohio Chemical and Surgical Equipment Co. division, succeeds Mr. Van Alstyne as advertising manager, and Henry W. Beck succeeds Mr. Scherer at Ohio Chemical.

The Dorr Co., Stamford, Conn., announces that Neil Munro has been appointed managing director of Dorr Oliver Ltd., Bombay, India, to succeed P. M. Contant, who is returning to the United States on leave. Harry Judson, formerly of the central industrial division of North American sales, has been named to succeed Mr. Munro as technical representative in Johannesburg, South Africa.

St. Regis Paper Co. (Canada) Ltd. has started production in the new multiwall bag manufacturing plant at Dryden, Ontario.

The Rust Engineering Co., Pittsburgh, Penn., has announced the election of R. L. Hess, Jr., as a vice-president of the company. He was formerly secretary.

The Heil Co., Milwaukee, Wis., has announced the appointment of Paul Miller as sales manager of the road machinery division in Milwaukee, to replace his brother, Robert Miller, who has resigned to become sales manager of Innes Equipment Ltd., Toronto, Ont., Canada, distributors for Heil road machinery in the eastern part of Canada. Mr. Miller was formerly sales manager of the Washington, D.C., office.

Kraft Bag Corp., New York, N.Y., has appointed Richard A. Berger, formerly with St. Regis Paper Co., as administrative assistant at the New York office, in addition to handling multiwall sales in the state of New York, exclusive of New York City.

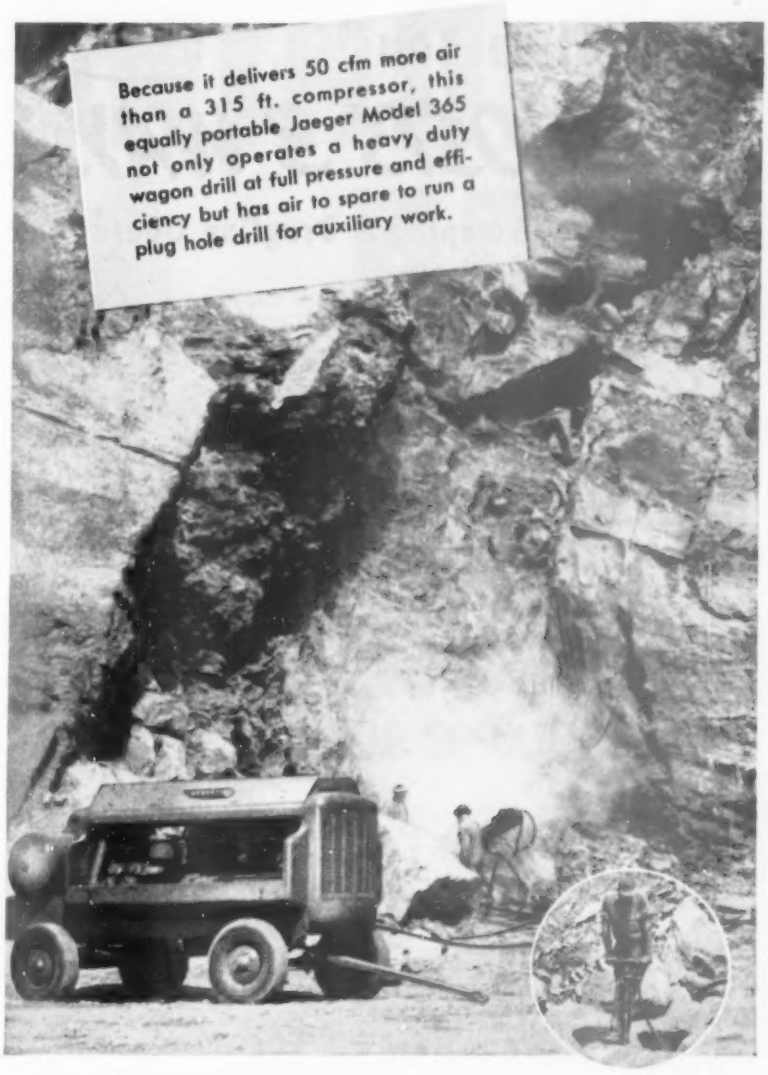
Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced plans for construction of a new building for the Kansas City branch near Independence, Mo., to serve agricultural and industrial dealers in Kansas, Missouri and Arkansas.

Link-Belt Co., Chicago, Ill., announces the appointment of Robert W. Suman as chief engineer for the new Colmar, Penn., plant, which is now under construction and scheduled to begin manufacturing operations later this year. He was formerly chief engineer for the Philadelphia plant and will be succeeded in this position by Norman Virkler.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., has announced the appointment of Paul L. Wright as manager of the Buffalo, N.Y., plant. He succeeds Clarence S. Gedney, manager for the past 23 years, who has retired.

The American Pulley Co., Philadelphia, Penn., announces the promotion of Walter L. Connell to regional manager. He was formerly district manager in the Minneapolis territory, which includes the states of Minnesota, Iowa, North and South Dakota, Nebraska and part of Wisconsin, Michigan, and Canada, and will be succeeded in this position by Gail E. Cogan. Robert E. Kochs has been appointed district manager of the Rochester territory which includes New York and part of Pennsylvania.

Jaeger "air plus" means 15% to 25% more air from portable compressors


Because it delivers 50 cfm more air than a 315 ft. compressor, this equally portable Jaeger Model 365 not only operates a heavy duty wagon drill at full pressure and efficiency but has air to spare to run a plug hole drill for auxiliary work.

As compact and portable as compressors of much less capacity, Jaeger Air Plus units produce, at the rock face, the air you need to operate your drills at full efficiency. Model 250 fully powers 2 heavy rock drills. Model 365 fully powers 3 heavy rock drills or one heavy wagon drill plus a plug hole drill. Model 600, introduced by Jaeger, was the first to run 2 heavy wagon drills efficiently. For increased production with low cost air power, see your Jaeger distributor or send for Catalog JC-1.

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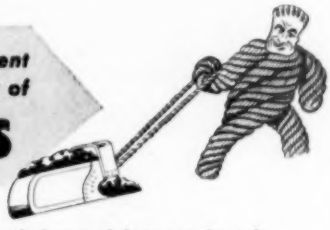

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Koehring Co., Milwukee, Wis., has announced the organization of another subsidiary company, known as Koehring Southern Co., Chattanooga, Tenn., to provide increased facilities for the development and manufacture of new models of Koehring power shovels and cranes.

Worthington Corp., Harrison, N.J., has announced the appointment of Paul J. Foley as manager of the Kansas City office and William M. Fine as manager of the Milwaukee branch office. Mr. Foley succeeds W. R. Kennedy, who has been named consultant.

Caterpillar Tractor Co., Peoria, Ill., announces the return of Herman G. Eberling from Army duties and his appointment as assistant manager of the Plains sales division.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., announces that Weaver E. Falberg has been appointed manager of the alloy steel division. He was formerly assistant manager and succeeds John W. Queen, who has been given special administrative duties while awaiting re-assignment in the organization.

Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, Ohio, has announced the appointment of Richard N. Benson and Peter D. O'Neill as field engineers in the Chicago district office. Stephen P. Terlecky has been named field engineer in the Philadelphia district office.

The Timken Roller Bearing Co., Canton, Ohio, has elected John A. Riley as secretary and treasurer to succeed the late R. C. Brower.

G. M. C. Truck & Coach Div., General Motors Corp., Pontiac, Mich., has appointed Richard C. Woodhouse as general sales manager to succeed J. E. Johnson, who will handle special assignments for the general manager. Mr. Woodhouse was formerly assistant general truck sales manager for the division. Julian M. Gilroy, formerly Chicago zone manager for G.M.C. Truck, has been appointed western regional manager.

Olin Industries, Inc., East Alton, Ill., has announced the appointment of John J. O'Neill, Jr., as manager of the research and development department of the explosives division.

Fleming Mfg. Co., St. Louis, Mo., has moved its sales office and production plant to Cuba, Mo. The executive office will be maintained in St. Louis. Production was started at the new plant in June, 1952.

Chicago Pneumatic Tool Co., New York, N.Y., announces the death of William Luther Lewis, president, after a short illness. He was 68 years old. Mr. Lewis joined the company in 1930 as vice-president, secretary and treasurer. He had been president since 1946.

Fruehauf Trailer Co., Detroit, Mich., announces the appointment of Victor G. Gross as manager of the Cincinnati, Ohio, branch. He was formerly

manager of the Dayton branch and will be succeeded in this position by E. R. Neumann.

General Electric Co., Schenectady, N.Y., has divided the fractional horsepower motor department into four separate sub-departments, each with a general manager, with headquarters at Fort Wayne, Ind., as follows: general a-c motor sub-department, Lisle D. Hodell; hermetic motor sub-department, Ab Martin; specialty motor sub-department, Jack J. Clarkson; and electric sink and laundry motor sub-department, Carl W. Moeller.

Pioneer Rubber Mills, San Francisco, Calif., has completed a new office and warehouse building in Los Angeles, where a full inventory of Pioneer's products will be stocked including industrial hose, belting, fire hose, packing, and similar items. W. S. Long is general manager of the Los Angeles branch.

Kensington Steel Co., Chicago, Ill., subsidiary of Poor & Co., announces the appointment of A. C. Erlandson as territorial sales engineer for lower Michigan, northern Illinois and southern Wisconsin.

New York Belting & Packing Co., Passaic, N.J., and the L. H. Gilmer Co., Philadelphia, Penn., have merged, and the new organization will continue to operate and be known as New York Belting & Packing Co. Products of the Gilmer company, including V-belts, flat belts, "timing" belts and shock pads, will retain the Gilmer name and will be sold by the new organization.

Traylor Engr. & Mfg. Co., Allentown, Penn., has announced the reelection of William J. Roberts, Sr., as president of the company for the 35th consecutive year. Born in North Wales, Mr. Roberts came to the United States with his parents when he was five years old, settling in Chicago, Ill., where he graduated from grammar school, took a one-year course in high school and attended Lewis Institute night classes. He started his career with Fraser & Chalmers, now a part of Allis-Chalmers Mfg. Co. Later he went to Colorado to gain practical experience in mining and milling, eventually becoming assistant manager of a mine. In 1907, he became a sales engineer in New York City for Traylor Engr. & Mfg. Co. Subsequently he became assistant sales manager and then sales manager, advancing to second vice-president, first vice-president and finally president, at the age of 35.

William J. Roberts, Sr.

Atlas Powder Co., Wilmington, Del., announces that the company has signed a contract with the Army Ordnance Corps to furnish consulting service in connection with the reacti-

CF&I

STEEL PRODUCTS FOR THE SAND AND GRAVEL INDUSTRY

GRINDING RODS

- Wear evenly
- Resist abrasion
- Rolled from special analysis steel
- Machine straightened with square cut ends
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THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
THE COLORADO FUEL AND IRON CORPORATION, DENVER and NEW YORK

CF&I
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THE COLORADO FUEL AND IRON CORPORATION

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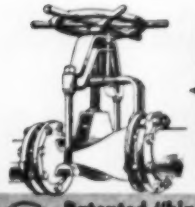

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Recesses molded into sides of sleeve act as "hinges" during compression, eliminating excessive strain and wear. These valves have been used successfuly for many years by various industries, wherever there is a problem of transporting abrasive or corrosive pulps or liquids. Here are some of the other proved advantages of these valves:

- Long Life Under Severe Conditions
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- Positive Closure on Solids
- No Working Parts in Contact with Pulps or Liquids
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- Withstands All Chemicals Not Harmful to Rubber or Neoprene
- Sizes from 1" to 12" dia.
- Withstands pressures up to 150 psi.

New free CATALOG gives complete information on Massco-Grigsby Rubber Pinch Valves; Marcy grinding mills for laboratory, pilot plant and commercial grinding; laboratory crushers and pulverizers.

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UNIVERSAL VIBRATING SCREEN CO.

RACINE — WISCONSIN

vation of the Volunteer Ordnance Works near Chattanooga, Tenn., and to operate the works for the manufacture of TNT, under the supervision of the Ordnance Ammunition Center, Joliet, Ill. A government ordnance works division has been established by the company under the management of Henry T. Clark. Charles G. Hersh has been named general manager of the Volunteer works.

Nordberg Mfg. Co., Milwaukee, Wis., has announced the appointment of T. D. Davis as western branch manager of the crusher and process machinery divisions. He will be in charge of the entire West Coast operation including the Northwest territory formerly under the jurisdiction of G. E. Jarpe, who was recently transferred to Duluth, Minn., as district manager of the North Central territory. Mr. Davis will make his headquarters in the San Francisco branch office, and will be assisted by J. W. Crandall and L. O. Makholm, sales engineers. Mr. Makholm was recently transferred from the Milwaukee office for this assignment.

T. D. Davis

Morris Machine Works, Baldwinsville, N.Y., announces that M. H. Pfarrer, vice-president of sales and engineering, has been transferred to the Chicago office where he will take over all sales and engineering in the territory formerly managed by the late F. S. Salchenberger.

Blaw-Knox Division of Blaw-Knox Co., Pittsburgh, Penn., announces that S. M. Pare has been appointed assistant manager of the construction equipment department. J. L. Sarosdy has relinquished his duties as chief engineer of the department to devote full time as manager and chief engineer of the steel forms department.

Worthington Corp., Harrison, N.J., announces that Ralph M. Watson has been named director of research to succeed Paul Disèrens, who has retired but will continue with the company in a technical consulting capacity in engineering and research.

Davey Compressor Co., Kent, Ohio, has appointed E. L. Mitchell as southwestern district manager in Texas, Louisiana, Arkansas and Oklahoma.

E. I. du Pont de Nemours & Co., Wilmington, Del., is celebrating its 150th anniversary this year, which was observed by nearly 7000 employes and members of the du Pont family at the site of the first mill on Brandywine Creek in Wilmington. The anniversary is also marked by publication of a book, "Du Pont—The Autobiography of an American Enterprise," tracing the company's role in the growth and development of the nation.

The Manitowoc Co., Inc., Manitowoc, Wis., is the new name of the Manitowoc Shipbuilding Co., which has revised its corporate structure into three separate corporations instead of divisions of the company. A new Wisconsin corporation named Manitowoc Shipbuilding, Inc., has taken over the shipbuilding and ship repair business, including the building of equipment for paper, cement mills, and fabrication of steel products. The manufacture of power shovels, cranes, draglines and other equipment will be carried on through the newly created Manitowoc Engineering Corp., of which J. D. West is president; C. C. Miller, vice-president in charge of sales; E. B. Nickles, vice-president in charge of engineering, and F. W. Zimmer, sales manager. Refrigeration activities will be handled through The Manitowoc Co., Inc. Each of the three corporations will have its own board of directors and officers, and will carry on manufacturing and distribution activities as an independent unit.

Buell Engineering Co., Inc., New York, N.Y., announces that J. A. McBride, who has been sales manager since 1938, has been named general manager and vice-president in charge of sales. Joseph A. Messenger,

J. A. McBride

Joseph A. Messenger

formerly vice-president, general manager and director, has retired from active service with the company to take up consulting engineering activities in Philadelphia, Penn.

The Euclid Road Machinery Co., Cleveland, Ohio, has appointed Cunningham-Ortmayer Co., Milwaukee, Wis., as distributor for the state of Wisconsin, and Butler-Sparks Equipment Co., Oklahoma City, Okla., for the state of Oklahoma.

Smith Engineering Works, Milwaukee, Wis., announces that Alexander Lorn Munro has been appointed director of engineering. Mr. Munro, who is secretary and a director of the company, was chief engineer and will be succeeded in this position by Elmer E. Kraig, assistant chief engineer, who has been with the company for 35 years.

Kraft Bag Corp., New York, N.Y., announces that the sales territory of John M. Wallace has been extended to include New Jersey, Pennsylvania, Delaware and Maryland. He will continue his headquarters in the New York office. Edward Burgurs, Jr., formerly in the sales department of the multiwall shipping sack division of The Union Bag & Paper Co., has been appointed to the sales depart-

Only BANTAM® gives you *all 3!*

1 *High-Speed Mobility*

Light-weight Bantam mounts on new or used truck . . . drives anywhere over paved highways, back-road bridges, or black top at full truck speeds . . . maneuvers in close quarters and off-highway locations, where bigger rigs can't go.

2 *Big Work Capacity!*

Rugged, fast-swinging Bantam digs up to 90 cu. yds. per hr. as dragline or shovel . . . lifts 10,000 lbs. on crane boom . . . handles ½ cu. yd. concrete bucket, 2400-lb. pile driver . . . digs up to 100′ of 5′ trench per hr. with hoe bucket. Eight fast-change attachments insure complete job versatility.

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(Less truck and mounting charges F.O.B. Waverly, Iowa)
Price includes complete dragline unit with std. 25′ boom, drag bucket, fairlead and additional counterweight. Other attachments extra. Price subject to change.

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"One-man" Bantam costs only a fraction of the price of bigger machines . . . runs all day on 8 gallons of gasoline . . . averages *less than $100 repair* cost per year (based on actual records of *over 3000 Bantams* on all types of jobs all over the world). Mail coupon below for full details and free Bantam demonstration.

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Shovels • Draglines

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DRAGLINE BUCKETS
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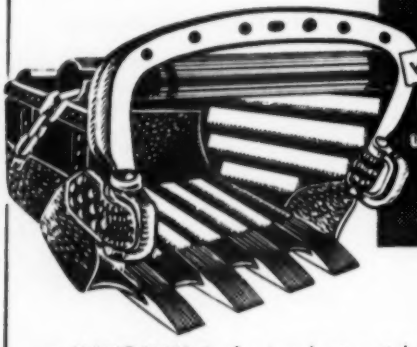
11% -13½% Manganese-Nickel Steel



- MANGANAL is the toughest metal known not harmed by heat.
- Workhardens under impact and abrasion to 550 Brinell.
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- Dragline buckets repaired with MANGANAL usually outlast new ones.
- For greatest strength attach with MANGANAL Bare or Special Tite-Kote Electrodes.

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Literature on latest methods for speedy and economical repair of worn equipment.
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NEAREST DISTRIBUTOR UPON REQUEST

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SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

ment of the Kraft Bag Corp. He will cover Illinois, Missouri and part of Iowa, with headquarters in St. Louis.

Viber Co., Burbank, Calif., has appointed J. A. Robinson as sales manager for high frequency internal and external vibrators in the United States.

Easton Car & Construction Co., Easton, Penn., announces that Cottrell Farrell, president, has sailed for Europe where he will visit cement plants in France and Italy. As many quarries in western Europe are now using American built Easton side-dump semi-trailers and truck bodies, Mr. Farrell expects to review the possibilities for introducing the company's equipment to other off-highway markets. He plans to study the manufacturing methods and facilities provided through Société E. Constantin, Paris, and Dario Sobrino, Milan.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the election of R. S. Stevenson as executive vice-president. He was formerly vice-president in charge of the tractor division and will be succeeded in this position by Willis G. Scholl, formerly vice-president and general sales manager. Frank Mussell, eastern territory manager, has been named to succeed Mr. Scholl as vice-president and general sales manager.

R. S. Stevenson

Mr. Stevenson has been associated with the tractor division since 1933 when he joined the Kansas City branch as a salesman. Two years later he became assistant manager of the branch at Omaha, Neb., and in 1936 was named assistant southwest territory manager, later becoming manager of the division's northwest territory. In 1941 Mr. Stevenson was appointed southwest territory manager, which position he held until he was named assistant general sales manager in 1948. In 1950 he was named general sales manager of the tractor division and in 1951 vice-president in charge of the division.

Willis G. Scholl

Frank Mussell

Mr. Scholl joined Allis-Chalmers in 1936 as a salesman for the Columbus, Ohio, branch of the tractor division.

In 1941 he was named assistant branch manager at Toledo and in 1943 became manager. Four years later Mr. Scholl was appointed manager of the eastern territory and remained there until 1951 when he was appointed general sales manager of the tractor division. He was named vice-president and general sales manager of the division later in the same year.

Mr. Mussell who recently served in Washington, D.C., as director of the National Production Authority's agricultural machinery and implements division, joined the company in 1936 as a blockman in the Des Moines branch of the tractor division. In 1937 he became agricultural sales manager of the Des Moines branch and in 1941 was named manager of the branch at Mason City, Iowa. He was appointed eastern territory manager in 1942.

Sterling Electric Motors, Inc., Los Angeles, Calif., has appointed the following distributors: Alex Borders Machinery Co., Birmingham, Ala.; Industrial Dairy Supplies, Inc., Millville, N.J.; Prussack Electric Co., Brooklyn, N.Y.; Petro-Chemical Equipment Co., Houston, Texas; and Elm Electric Supply Co., Stamford, Conn.

American Brake Shoe Co., New York, N.Y., has announced the appointment of Robert C. Carruthers as assistant sales manager, welding products, American Manganese Steel division, Chicago Heights, Ill. He was formerly sales development engineer with the division.

St. Regis Paper Co., New York, N.Y., announces that its new multiwall bag plant at Tacoma, Wash., is now in production and replaces the leased plant which the company formerly operated at Seattle.

Caterpillar Tractor Co., Peoria, Ill., announces that Trackson Co., Milwaukee, Wis., has now become a subsidiary of the Caterpillar company.

Hudson Pulp & Paper Corp., New York, N.Y., announces that Joseph L. Richardson has been named resident manager of the mill in Palatka, Fla. He succeeds George Balko, who has been assigned to special duties.

Westinghouse Electric Corp., Pittsburgh, Penn., has appointed J. C. Fink as engineering manager of industrial products. He was formerly assistant to the vice-president in charge of engineering. He has been associated with the company since 1927.

American Hoist & Derrick Co., St. Paul, Minn., announces that John E. Carroll, vice-president of sales, has been elected to the board of directors.

Gar Wood Industries, Wayne, Mich., has announced the appointment of Leo M. Brown as assistant sales manager. He was formerly district manager serving the states of Texas, New Mexico, Oklahoma, Mississippi, Arkansas and Kansas. Edward R. Curry has been appointed to succeed Mr. Brown as South Central district manager.

The above picture illustrates one of the many ways of applying a Sauerman Drag Scraper in the open storage of bulk materials. Here the scraper stores crushed rock in a high pile covering a large area and then reclaims (as shown in picture) to a hopper at processing plant.

SAUERMAN method . . .

Simplifies Material Handling!

At hundreds of sand and gravel plants, rock processing plants, cement mills, etc., where there are problems of long range excavating or stockpiling, Sauerman Drag Scrapers and Slackline Cableways constantly prove their ability to handle large yardages at low cost.

A Sauerman machine reaches across a river, down into a pit, up to the top of a hill or across a wide stockpile — moves material from any point within its radius, and dumps automatically wherever required. One-man control, fast action. Power requirement is moderate. Maintenance is easy; a few expendable parts take all the wear.

Whether your project is large or small, there is a size and type of Sauerman machine suited to your requirements — a machine that will give you years of steady service at minimum expense, no matter how tough the work it is called upon to do.

Write us about your interests and we will send illustrated catalog by return mail.

Sauerman Scraper Excavator Digs Gravel from Hill.

Sauerman Scraper Stockpiler Stores and Reclaims.

Sauerman Slackline Cableway Works in Wet Pit.

Rope Haulage Equipment Specialists Since 1909

SAUERMAN BROS., Inc.

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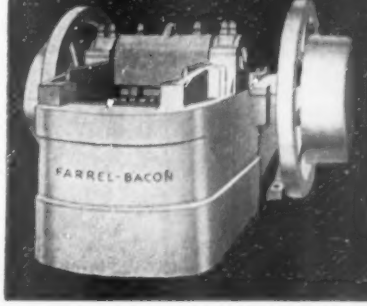
COMPLETE CRUSHING PLANTS
designed and equipped by FARREL-BACON



Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10" x 7" *Write for complete information.*

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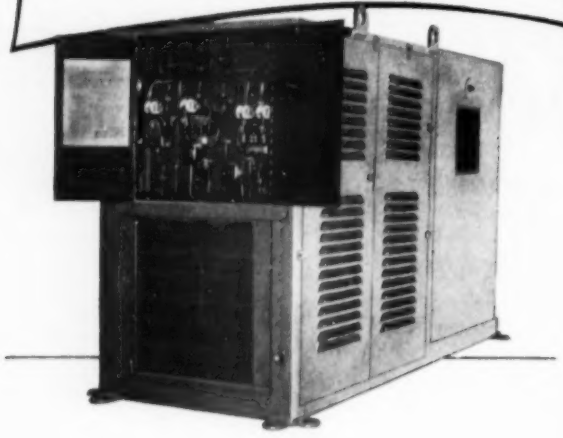
Only DRAVO

CRANE CAB COOLERS and CONDITIONERS

HAVE THESE 6 EXCLUSIVE FEATURES



HERE ARE THE *PLUS* ADVANTAGES THAT DRAVO CRANE CAB COOLERS AND CONDITIONERS OFFER YOU—

1. COOL AND CLEAN AIR SUPPLY. All self-contained and split-type Dravo Crane Cab Coolers are equipped with a forced-ventilation system, insuring a supply of cool air free from dust and fumes to the compressor motor.

2. RUGGED CONSTRUCTION. Dravo Crane Cab Coolers and Conditioners are supported by a structural steel frame of all-welded construction.

3. MAXIMUM VOLUME OF AIR. All units are equipped with centrifugal-type squirrel-cage fans which furnish maximum amount of air.

4. HIGH EFFICIENCY. Condenser discharge air exhausts directly into atmosphere, permitting lower operating temperatures within condenser section.

5. CONTROL PROTECTION. Heavy-duty industrial controls are enclosed in a forced-ventilation cabinet, free from dust and fumes.

6. COMPLETE LINE OF EQUIPMENT. Only Dravo has a complete line of crane cab coolers and conditioners. Interchangeable parts reduce inventory costs.

Dravo Crane Cab Coolers and Conditioners protect crane cab operators' health, increase their efficiency and alertness, insure safety and improve production records . . . they provide complete air conditioning, filter the air, remove dusts, dirt and fumes; heat the cab in winter, cool it in summer, provide constant ventilation the year around.

AVAILABLE FOR PROMPT DELIVERY. Installation of Crane Cab Coolers and Conditioners is quick and easy with a minimum of downtime required. Write for more information, or phone the nearest Dravo sales office and have our representative call on you.

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607 Dravo Building, Fifth and Liberty Avenues, Pittsburgh 22, Pa.

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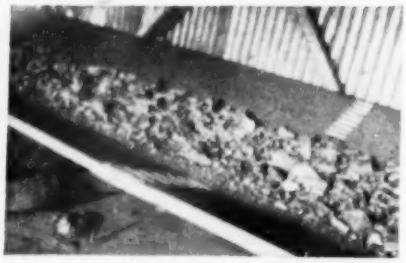
DETROIT • NEW YORK • PHILADELPHIA • ST. LOUIS • WASHINGTON

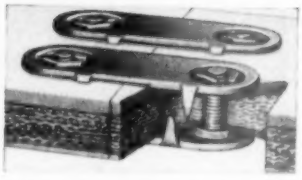
FLEXCO ®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.



Compression Grip distributes strain over whole plate area

★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

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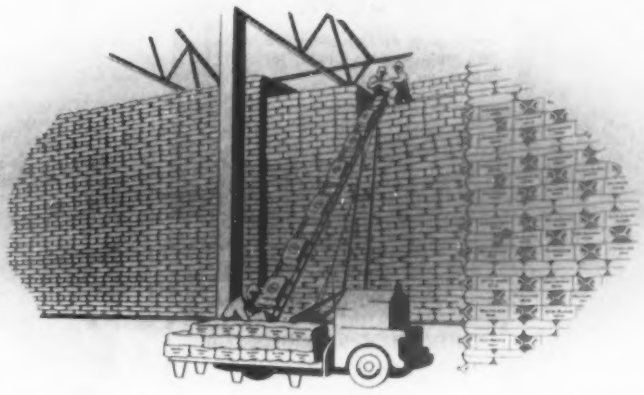

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1. Papers and materials of highest quality are used in Hammond Multi-Walls.
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3. Pride of workmanship—thorough knowledge of your shipping problems assure you of finest Bags for your needs.
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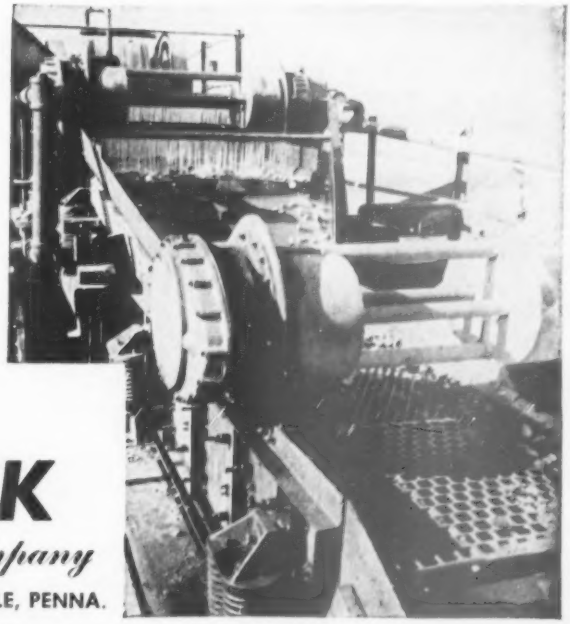
Cut your screening costs...

with Hendrick Perforated Plate

Screening costs are greatly reduced by the use of Hendrick Perforated Plate on vibrating and shaking screens because—

- of the exceptionally long service life of Hendrick Perforated Plate.
- product uniformity is assured, since Hendrick Perforated Plate always maintains uniformity of mesh.
- the full clearance of Hendrick Perforated Plate practically obviates clogging.
- of the labor-saving ease and rapidity with which decks can be changed.



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Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids

POWER UP —
POWER DOWN
Loads up to 30 tons raised to 70° high-dumping angle, for fast, clean dumps
HEAVILY REINFORCED BODY DESIGN
Box-member ribs provide stamina needed to stand up under heavy loads of rock and ore

Just 2 advantages of HEIL Double-Acting Twin-Arm Hoists and Rock Bodies!

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For one thing, the hoist frame is steel plate, reinforced with box-section cross-members. It takes all stresses imposed by the action of the hoist, without transferring these stresses to the truck frame.

Then there's the twin-arm linkage assembly: It embodies the simple principle of the toggle — and develops exceptional lifting power with extremely low oil pressure. Built-in snubber prevents "kick-back" or over-dumping with sticky loads.

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These and other Heil advantages keep your Heil Dump Unit *out* of the shop, *on* the job. Have your nearby Heil distributor show you. Or write us for further information.

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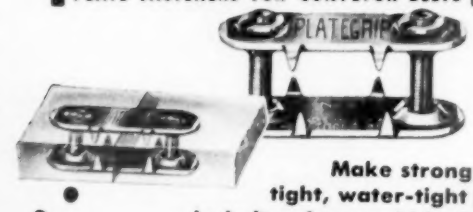
PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



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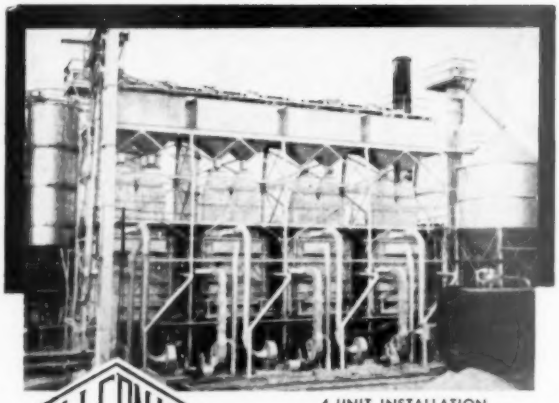

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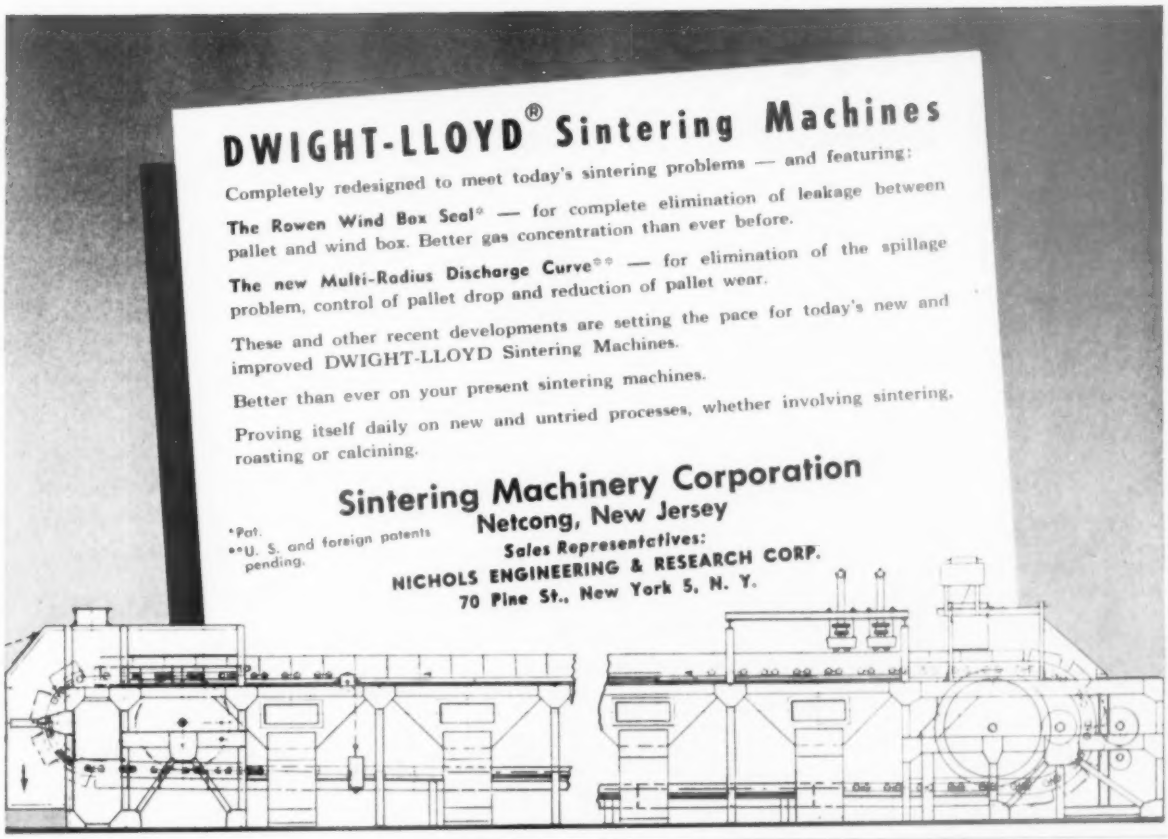
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RESISTO-LOY *will easily add 50% to the life of*

Gyratory Segments

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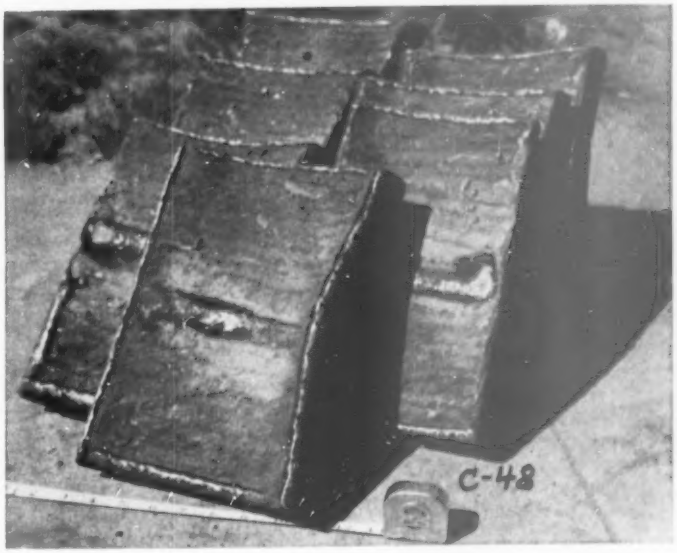

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One single application of RESISTO-LOY actually extends the life of the Liners to a minimum of 50% and the cost of this application is but a fraction of the cost of new segments.

This is another of those jobs that can easily be handled by the maintenance welder. Just a careful adherence to the suggestions made by our Field Man will enable the welder to make a perfect job of coating these liners with RESISTO-LOY.

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Eliminating excessive costs could mean eliminating old, obsolete equipment. When replacing your worn, out-of-date hauling equipment, be sure you put LANDIS in your fleet! LANDIS' smooth-surface welded bed construction means no more "free rides" for load-hangers!

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Smooth bed surface with no nuts, bolts, heads, etc., permits quick, easy discharge of complete load. Available with end, side or bottom dump, plus safe, positive connection with sure, instant response.

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WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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Combination Concrete Heater and Thawer

Introduces clean heat right into concrete mixer drum. Burner clamps on mixer; can also be used as thawing burner.

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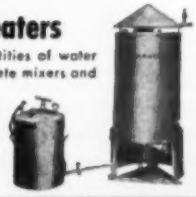
For hopper cars, concrete forms, stone, sand and gravel piles. Heavy duty burners with welded steel fuel tanks—deliver large, intense flame; save time and labor.

Water Heaters

Heat large quantities of water quickly for concrete mixers and central mixing plants.



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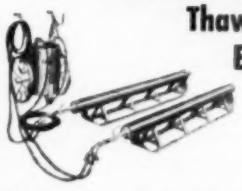

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Slump brick used for interior masonry walls (see page 143)

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INDUSTRY NEWS

N.C.M.A. Directors Visit Washington Plants

CONCRETE PRODUCTS ASSOCIATION OF WASHINGTON, Graystone Concrete Products Co. and Layrite Concrete Products Co., Seattle, Wash., and Associated Sand & Gravel Co., Everett, Wash., were hosts recently to a group of members, and their wives, of the directors of the National Concrete Masonry Association, whose visit followed their attendance at the mid-year board meeting in San Francisco, Calif.

Private car tours were made to some of the local products plants and to points of scenic interest in the city. The visiting group were also guests at a cocktail party and banquet. R. W. Condon, the newly elected president of Concrete Products Association of Washington, was the master of ceremonies. Following the dinner, a colored movie of Seattle was shown, after which a discussion was held on problems relating to the concrete block industry.

Those in attendance were Mr. and Mrs. H. W. Bush, East Orange, N.J.; Mr. and Mrs. W. J. Manhardt, Milwaukee, Wis.; Mr. and Mrs. E. H. Brooke, Washington, D.C.; Mr. and Mrs. F. W. Reinhold, Buffalo, N.Y.; Mr. and Mrs. P. M. Woodworth, Chicago, Ill.; Mr. and Mrs. E. W. Dienhart, Chicago, Ill.; Glen C. Barnes, Syracuse, N.Y.; Mrs. Evelyn Bouet, Chicago, Ill.; E. A. Peterson, Ventura, Calif.; Harvey Kilmar, Des Moines, Iowa; and Mr. and Mrs. Lewis Lloyd, New Orleans, La.

New Batching Plant

PREMIX CONCRETE, INC., Kennewick, Wash., is establishing a batching plant in Pasco, Wash., to furnish approximately 18,000 to 20,000 cu. yd. of concrete for new piers for Northern Pacific Railroad's new Columbia river railroad bridge. Capacity of the plant will be about 600 cu. yd. per day.

The installation is planned as only temporary, but may be continued on a permanent basis if the demand for ready-mixed concrete in Pasco warrants it, according to Charles Noyes, vice-president and general manager. The company also operates plants in Kennewick and in Richland, Wash.

Plant Expansion

WALT KEELER CO., INC., Wichita, Kan., since its establishment in 1941, has grown into one of the largest ready-mixed concrete companies of that area. Starting with two transit-mix units, the company has since expanded until it now operates eleven 3-cu. yd. mixers, twenty-one 5-cu. yd. mixers and six 8-cu. yd. mixers, giving a daily capacity of 1500 cu. yd. The company, employing 100 persons, has an annual payroll of approximately $360,000. In addition, the company operates a batching plant in South Wichita and also a sand and gravel plant. Walt Keeler, president, is a director of the National Ready Mixed Concrete Association and a director of Monarch Cement Co. of Humboldt, Kan.

Eastern Concrete Meeting

THE BINGHAMTON DISTRICT of New York State Concrete Producers Association held its second annual meeting at the Arlington hotel, Binghamton, N.Y. Frank W. Donovan, district engineer, New York State Department of Public Works, was moderator at a roundtable discussion. William A. Terry, association director for the Ninth District, presided at the meeting. Donald A. Davis, Municipal Construction Co., Binghamton, was in charge of arrangements.

Companies Expand

CEMENT SPECIALTIES CORP., St. Petersburg, Fla., has doubled its production of specialty brick, block and "Simstone." The company, which produces 23 concrete items, is now owned by Ross Sims and L. J. Vrooman.

John C. Kasman, the new owner of Florida Modern-Crete, Inc., is expanding the St. Petersburg firm's facilities for precast sectional wall panels.

Tilt-Up Construction

THE WORLD'S LARGEST warehouse, a 29-acre structure for the U.S. government near Washington, D.C., will be built utilizing tilt-up concrete construction. Each wall section is 20 ft. long, 6 to 8 in. thick and weighs up to 20 tons. An estimated 200 buildings will be constructed over the country using such panels this year.

New Ready-Mix Plant

ROBERT SLETTEDAHL, Montesano, Wash., owner, has announced the organization of El Monte Ready-Mix, Inc., to service eastern Grays Harbor county. The plant will be located at the El Monte Lumber and Fuel Co., Elma, with Edward Seaman in charge. Two Ford trucks, equipped with 3-cu. yd. Challenge mixers have been purchased. Other new units in the $25,000 plant include a weigh batcher, a Hough Payloader, scales and a conveyor.

Buys Block Plant

FALLS CITY HOLLOSTONE CO., Falls City, Neb., formerly known as Falls City Cement Products Co., was recently purchased by Dewey H. Young who plans to produce both sand-gravel concrete block and lightweight concrete block. Capacity of the plant is approximately 3000 block per day. Paul Belleau is in charge of plant operations.

BEAVER READY MIX CONCRETE CO., Juneau, Wis., is building a branch plant in Waupun, Wis., which will serve an area north to Fond du Lac.

SHERMAN CONCRETE AND PIPE CO., Johnson City, Tenn., is now producing 66-in. concrete pipe, the largest ever produced by the company. Most of the 66-in. and 54-in. pipe produced are being used in construction of the naval guided missiles plant near Bristol, Tenn., according to Ike Greene, vice-president and general manager.

SUPERLITE CORP., Phoenix, Ariz., has established a distribution plant in Yuma, Ariz., which is under the management of Robert Olson. Superlite Corp.'s manufacturing plant is located at Calipatria, Calif., where the company operates a pumice mine and a pumice block and brick plant.

RUSSELL CONCRETE PRODUCTS CO. recently established a new ready-mixed concrete plant at Three Rivers, Mich. Plant facilities include a batching plant and two 6-cu. yd. transit mixers. The plant will also handle other concrete products manufactured by Russell Concrete Products of Sturgis, Mich. Robert Reed is owner and G. Fred Kays is plant manager.

WASHINGTON BRICK AND LIME CO., Dishman, Wash., was recently host to more than 50 members of the Spokane, Wash., chapter of the American Institute of Architects, at a barbecue held at the company's plant.

CINDER CONCRETE PRODUCTS CO., Denver, Colo., recently installed equipment to eliminate dust and smoke from its plant operations. Cost of the installation was $100,000.

SYRACUSE READY-MIX CONCRETE CO., INC., has opened a new plant in Syracuse, N.Y., at Clark and Burnet Ave.

JOHN L. PARKS of Bartlesville, Okla., announced the opening of a ready-mixed concrete plant at Nowata, Okla.

PINELLAS INDUSTRIES, INC., St. Petersburg, Fla., will invest approximately $500,000 for a concrete products plant. Approximately 100 people will be employed with an annual payroll of about $500,000 to manufacture a variety of concrete products, including pipe, block, and ready-mixed concrete. The company will also sell lime, sand and cement and produce an asphalt mix.

PRE-CAST CONCRETE PRODUCTS CO. Detroit, Mich., has begun production of precast reinforced concrete slabs for use in walks and patios. The slabs are produced in two sizes, 25 x 30 x 1¼ in. and 12 x 30 x 1¼ in.

THE EVERTRU concrete products plant at Moses Lake, Wash., formerly owned by E. E. Pepper, has been purchased by Evertru Products, Inc., a newly incorporated firm headed by Donald W. Walters, manager of Inland Empire Industrial Research, Inc., Spokane, Wash. Also associated with the new company is Carl B. Warren, head of Spokane Concrete Pipe Co.

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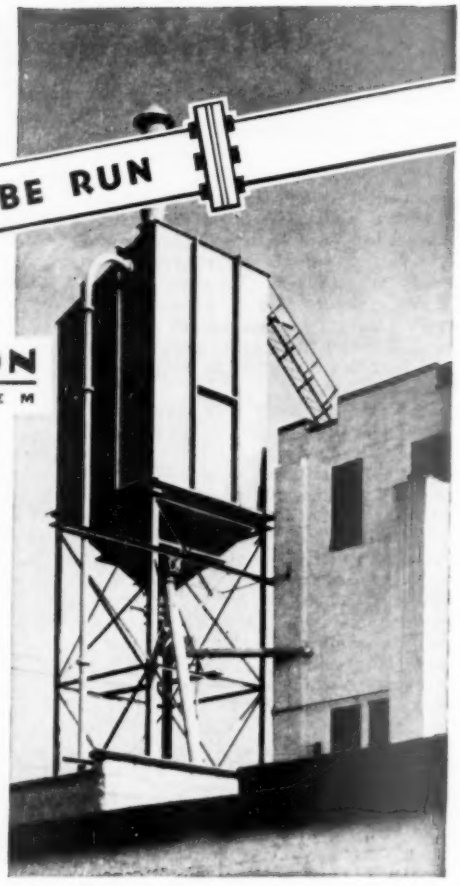

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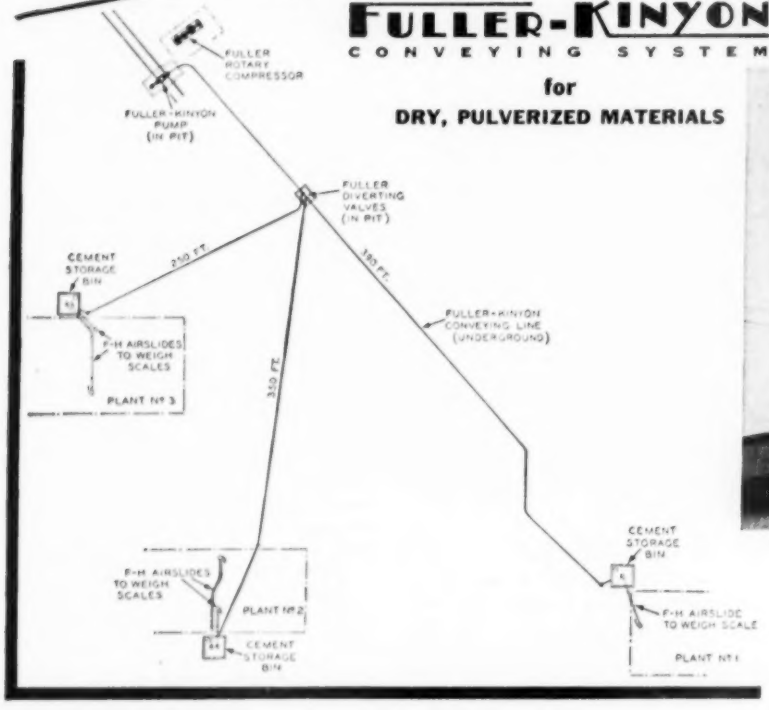

Unloading . . .
conveying underground . . .
to three delivery points

The layout of the concrete-products plant shown above, really three plants in one, necessitated unloading all shipments of Portland cement at one particular location, but distribution to storage had to be made to three widely scattered points.

The engineers of this plant turned to Fuller for suggestions and aid in selecting the most efficient and economical method for handling the cement. As a result of studies made, and proposals submitted, they selected the Fuller-Kinyon System. Note that all conveying pipe lines are installed underground, eliminating all structural interference above ground in the yard.

Cement, received in hopper-bottom cars, is conveyed by the Fuller-Kinyon Pump, located in a pit underneath the tracks, to all storage bins, by the use of Fuller diverting valves in the transport line. The system has a capacity of 200 barrels an hour.

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Engine moved to rear of mixer, thereby cutting almost 20" off the over-all length. Enables you to move your mixer forward, thus shifting center of gravity and putting a bigger share of the load on the front axle. Gives you better weight distribution without using Cab-Over or Cab-Ahead type of trucks. Or, you can use a shorter wheelbase truck and get greater maneuverability. Both engine and transmission are completely accessible. Three standard LOADLIMIT sizes: 4½, 5½ and 6½ cubic yards as mixers, with higher ratings for agitators.

SMITH-MOBILE 2
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Mixer engine eliminated. Reduces dead weight of mixer by about 1300 lbs. Mixer can be mounted closer to cab, removing considerable weight from rear axle and putting it on front axle. Enables you to meet stringent rear-axle load restrictions. One engine instead of two also means less fuel consumption, less engine maintenance. Available for both LOADLIMIT and CLOSED END models, in 4½, 5½ and 6½ yd. sizes, higher ratings for agitators.

SMITH-MOBILE 3
Trailer Mixer

Enables you to carry from 8 to 9 yard payloads and still be within highway load limits. Most states are more liberal with payloads allowed on semi-trailers than they are with loads carried in standard truck mounted mixers. Trailer Mixer can carry up to 12,000 lbs. additional concrete, legally, depending on state regulations . . . is just as easy to maneuver in most cases. Tractor can also be used for many other purposes. Available for 6½ yd. mixer, 8⅝ yd. agitator, LOADLIMIT and CLOSED END models.

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GLAZED FACE CONCRETE UNITS

Concrete Pipe & Products Co.'s Richmond, Va., plant produces faced masonry units for decorative interior architectural effects

By WALTER B. LENHART

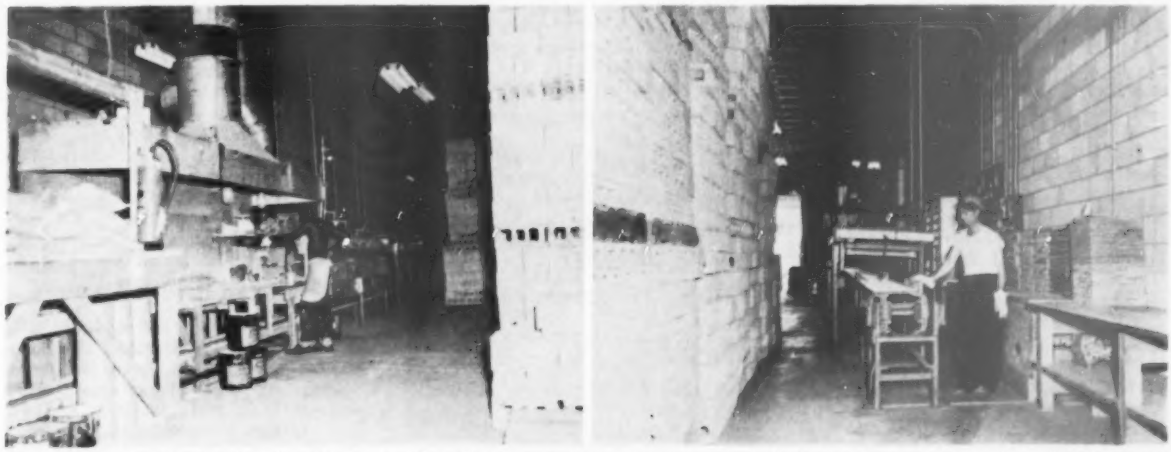
EIGHT PLANTS have now been built in the United States to manufacture Spectra-Glaze, a glazed face concrete building unit using The Burns & Russell licensed process (see "Adding Beauty to Concrete Masonry Construction," ROCK PRODUCTS, June, 1951, page 182). The first one was built in Tennessee to produce Spectra-Glaze Type A units, and the second at Alton, Ill. The original Alton plant was a pilot type operation which was replaced in 1950 with an extremely modern plant utilizing an infra-red gas system of high production. The third plant was built in Baltimore, Md., and is not now operating. The fourth plant is that of Concrete Pipe & Products Co., Inc., Richmond, Va. This plant has been in continuous service a year, a sufficiently long enough time to demonstrate the commercial success of the operation. The fifth plant was constructed in Yonkers, N.Y., and in July and August of this year three new plants started production. These are: Standard Glaze Block Corp., Troy, N.Y.; Edgewood Pallet Co., Salisbury, Md.; and Glazed Block Corp., Rochelle Park, N.J.

Spectra-Glaze is the tradename licensed by The Burns & Russell Co., Baltimore, Md., to designate a unit glazed with its "Cermac" compounds. Basically there are two broad types of Spectra-Glaze: Type A is the textural face unit, consisting of a colored glazing material that is sprayed on the face of a concrete block by a special technique, after which the glazing material is baked to the unit. The resulting texture is that of the base block; the application of the glazing does not materially change the texture, but does add a permanent and attractive face. Type B Spectra-Glaze block are called "tile face" units and are made by giving conventional concrete block a fine-grained, smooth, water resistant, permanent colored facing.

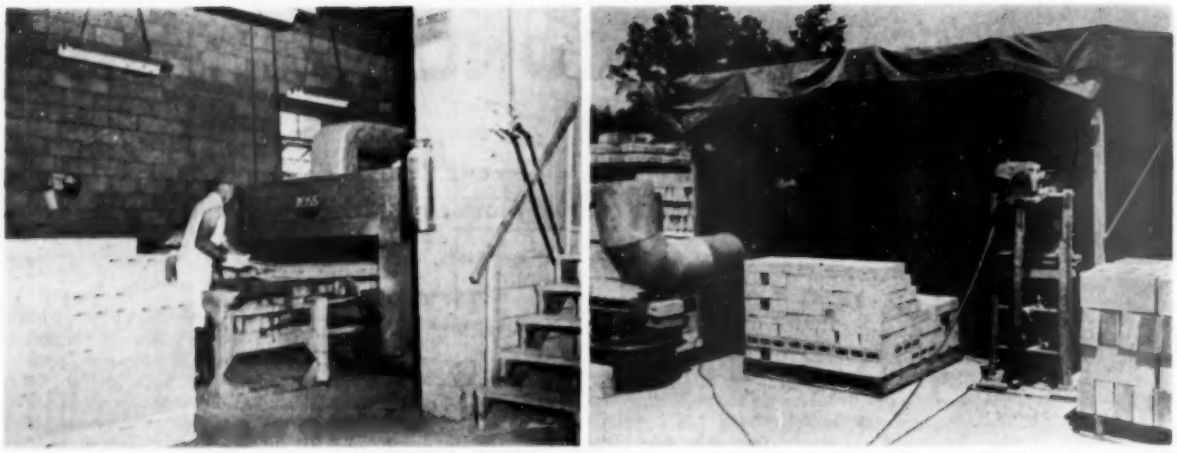
We have inspected several of the plants mentioned above and it is our opinion that the success of the Richmond operation hinges on the use of a concrete block with low shrinkage properties, as well as upon aggressive salesmanship. The Richmond plant operates under the name of Spectra-Glaze Division of Concrete Pipe & Products Co., Inc. The parent company has two concrete block plants in the Richmond area, both of which use high pressure steam curing. The newest high pressure steam curing plant was described in the August, 1951, issue of ROCK PRODUCTS, page 232. It operates under the name of Superior Building Units, Inc. The use of high pressure steam curing tied in with the use of Solite, a locally made expanded shale lightweight aggregate, or cinders, has resulted in a strong block with exceptionally favorable shrinkage characteristics.

Harry W. Easterly, Jr., executive vice-president of Concrete Pipe & Products Co., Inc., has been quite active in the development of concrete block with low shrinkage properties and in a recent publication pointed out the need of a specification defining maximum shrinkage in concrete masonry units, and that present specifications limiting moisture content are inadequate. He points out that the shrinkage of high pressure steam cured block is about half that of high temperature steam ("Correlation of Shrinkage and Curing in Concrete Masonry Units," *Journal of the American Concrete Institute*, January, 1952, page 393). This favorable shrinkage characteristic is an important factor in the long range durability of Spectra-Glaze Type B units, for the application of a face to a concrete block requires that the expansion properties be similar. This requirement in the finished block can be met most easily by keeping the coefficients low. Block cured by high pressure steam seem to meet this specification more precisely.

The operational differences between the Baltimore and Richmond operations vary only in some of the details. Basically the two plants are the same. The cycle of operation consists of manually placing stainless steel molds on a moving conveyor. The molds move under a reciprocating arm, or "mechanical extruder" which feeds an even and continuous stream of the glazing slurry into the molds. An operator is stationed at the extruder to make such adjustments as are necessary to insure an even amount of material going into each



Left: An operator is stationed at the extruder to make adjustments to insure an even amount of glazing slurry going into the molds. Fumes are carried away by fans in the exhaust hood. Right: Feeding empty molds onto the continuous conveyor which passes under extruder in background



Left: Operator placing concrete block in molds full of glazing slurry. The units then go through the baking oven, taking about 1 hr. to cover the 68 ft. distance. Right: Saws are available to trim block to other than modular sizes. The saw at the left is enclosed in a dust hood

mold. The molds are weighed from time to time to spot check the amount of compound used.

After passing under the extruder the molds are vibrated on the conveyor, after which they are manually placed at the receiving end of the baking oven. At this point a cured concrete unit is placed face down onto the upper surface of the slurry in the mold, after which the mold and block pass through the baking oven. The molds for a standard 8- x 16-in. block are 15¾ x 7¾ in. Since the block is 15⅝ x 7⅝ in. the dimensions of the glazed facing are ⅛ in. larger than the block itself, with $\frac{1}{16}$ in. protruding at each end. In regular 8-in. coursing, these units are modular with the ⅜-in. mortar joint, of which only ¼ in. is exposed.

The compound used is called Cermac and is a development of Burns & Russell. To the Cermac is added catalyst and inert filler to form the slurry.

The mixing must be done near the point of use in relatively small amounts because of the setting properties of the slurry. The mixing platform is just above the extruder and 15-gal. mixes are made and then pumped to a 60-gal. storage tank just ahead of the extruder. The pipelines are flexible, as short in length as possible, and can be removed for occasional cleaning out. Pumping to the extruder is by means of compressed air, using the principle of the so-called "pressure case," or Monte Ju.

Just ahead of the extruder is an electric furnace used only on the Type A block; it was made by Sweitzer Equipment Co. In this preheat booth, the surface temperature of the block is brought up to 180 deg. F., and then in rapid succession three coats of glazing compound are sprayed directly onto the block in the spray booth. The sprayed block are then transferred to the oven where the glazing compound is hardened to a glossy finish.

The drying or baking oven, a forced hot air unit, is oil fired and automatic. A gas flame is first ignited by an electric spark, after which the oil flame ignites. It is 8 ft. wide and 68 ft. long, totally enclosed, and is provided with fans to draw off the vapors released in the baking process; J. O. Ross Engineering Co. manufactured the unit. The oven is divided into three zones for temperature control, the temperature in the first zone reaching about 250 deg. F. and about 375 deg. F. being the maximum used in the second zone. A block takes about one hour to pass through the baking oven. The conveyor in the oven is driven through a Reeves Foote drive.

At the outboard end of the oven the block are removed from the molds, and after inspection the molds are returned to the system. Solite is used in the Type A block (sprayed type) and both Solite and cinder block are used for the Type B (tile-face units). A Towmotor lift truck handles palletized block from the plant. Production is at the rate of 2500 tile face or 3000 textural face units per 8-hr. day.

The Type B Spectra-Glaze units (tile faced) are made in seven colors: light green, aqua green, light rose, soft pearl, warm beige, colonial blue and dusky red. Some special shapes are hand made but by far the bulk of the production is by the method described.

The sizes made range from 2- x 8- x 16-in. furring to 12 x 8 x 16 in. Clipper saws are available to trim block down to other than modular sizes. Spectra-Glaze units are designed for interior use only, but experimental work is being carried out on the development of a stable exterior unit. The price of the block competes favorably with clay tile and other types of interior decorative materials.

Spectra-Glaze units present an attractive surface as illustrated here in the storage yard

Tests of the glazing on Spectra-Glaze units indicate a high resistance to most common chemical solutions, and exposure to temperatures ranging from 10 to 230 deg. F. produces no cracking or softening. The glazing is equally resistant to thermal shock and to the staining effects of such materials as cold lubricating greases, oils and hot animal fats. A free-falling 1 in. dia. steel ball produced no microscopic cracking when dropped on the glaze from a height of 7 ft. The gloss and hardness of the glaze are not affected by an 8-hr. exposure to steam vapor at atmospheric pressure, and compression loads up to 1300 p.s.i. have caused no damage.

The Spectra-Glaze operation is housed in a new concrete block structure in the yard of the Belt Blvd. and Petersburg Pike plant, which is also the general office of the company. Several rooms are attractively lined with Type B Spectra-Glaze units.

The Spectra-Glaze Division of Concrete Pipe & Products Co. is under the management of Frank G. Louthan, Jr., assisted by W. B. Nugent. W. G. Hargraves is plant superintendent. Stanley R. Navas is president of Concrete Pipe & Products Co.; Harry W. Easterly, Jr., is executive vice-president, and Harry C. Hofheimer II is secretary-treasurer.

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Prestressed Bridge

F. HURLBUT Co., Green Bay, Wis., has completed Wisconsin's first prestressed concrete bridge for the Brown county highway department. Each deck is 3 ft. wide, 20 ft. 6 in. long and weighs 5 tons. The span is 18 ft. and the decks have 7-strand steel wires running through them.

DRYING CONCRETE MASONRY UNITS

Tests indicate that it is practical to reduce moisture well below any specifications with correctly designed drying kilns

By WILLIAM J. SHORE*

BECAUSE OF THE EVER increasing demand for concrete block with lower moisture percentage many concrete masonry producers are considering the installation of drying kilns with the necessary mechanical equipment to provide air changes and heating requirements.

This article is based upon a series of tests made by the author in a small pilot kiln that had been temporarily adapted for drying block and the results of these tests contain data and information that should be of great interest to producers contemplating the future installation of block drying equipment.

In the block drying technique, end results are not simple to arrive at. Many factors either promote or retard drying, and the elimination of moisture from block does not follow straight line functions of change. Generally, moisture is driven out rapidly at the start. This initial high rate of dispersal drops as the process continues and then tends to level off at the end of 8 hr. of operation. From then on it continues at an ever decreasing rate so that from a period beginning 12 hr. after continuous operation, water loss become practically negligible.

Standard tests for drying block to zero moisture call for a continuous application of heat over a period of 48 hr., just to make certain that all water has been forced out of the block undergoing test. In practice, however, there is no call for block of zero moisture and any drying system that requires 48 hr. for its operation would be too high in original cost, too high in operating costs and would take up too much space for any amount of drying production.

In practice, nominal requirements are 40 percent moisture content. Because of failure to meet this requirement, block failures occur due to shrinkage of block when set in walls. To meet this, specifications are becoming more tightly drawn with respect to moisture content and, on certain types of masonry construction, block are demanded with no more than 30 percent average moisture content.

Because there are few block drying systems in operation, not too much is known of the technique of drying block. For the average producer with no laboratory facilities, the data in this article should be helpful. Tests required to determine block moisture content are awkward to carry out; they demand equipment, technical help and considerable time for their completion. When block are to be dried in production, it is first necessary that previous tests have been made to indicate initial moisture content as received, and further tests to indicate total water absorption and total dryness. With these facts, it is possible to load block in drying kilns and be assured after a certain number of hours' operation that the requisite degree of moisture percentage has been attained.

To determine the rate at which water is lost, it might be done by removing one block every hour or every half hour and running a series of tests to determine the exact amount of water loss during the tests for varying periods of time elapsed. Needless to say, a test like this would require more time and expense than good judgment might warrant. As a result of the tests mentioned previously, it has been possible to compile a chart and obtain such data, showing the successive loss of water from block when they have been drying over a period of 23 hr.

To illustrate how this has been accomplished it might be of interest to describe briefly the equipment used for making the drying run and the manner in which observations were made and recorded.

Block Placement

The placing of block in a drying chamber is important and has a direct bearing upon the amount of water lost per block. If block are loaded in a drying kiln in cubes as they now nominally are piled, drying results will not be good. Block in cubes will lose over a period of 23 hr. an average of 1.12 lb. of water per block. Where block are stacked horizontally with holes allowing free passage of hot recirculated air, average loss of water per block is 1.57 lb. (Block above are cinder block weighing from 32 to 33 lb. each as received.)

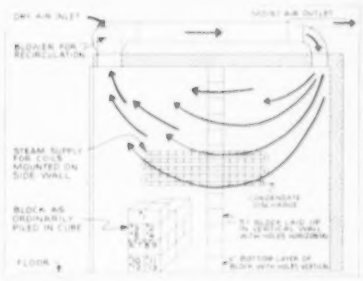


Fig. 1: Side section of drying kiln

It is evident that proper placement of block achieves an increase in water lost amounting to almost 50 percent over that lost when block are set in cubes. (It is impossible to dry out ordinary cubed block except at a prohibitive cost for fuel and costly kiln construction.)

Kiln Layout

The accompanying sketch (Fig. 1) gives in rough outline the general kiln appearance, and heating and blowing equipment. Heat is furnished by steam flowing in two pipe coils

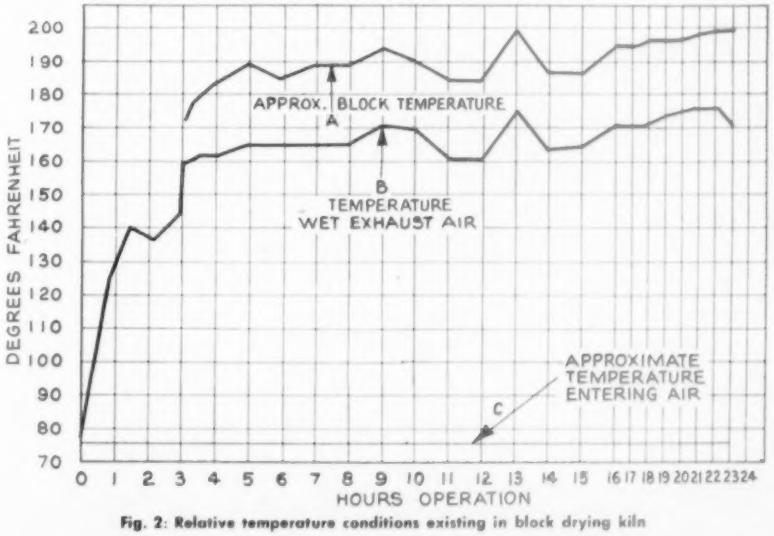


Fig. 2: Relative temperature conditions existing in block drying kiln

*Shore Engineering, New York, N.Y.

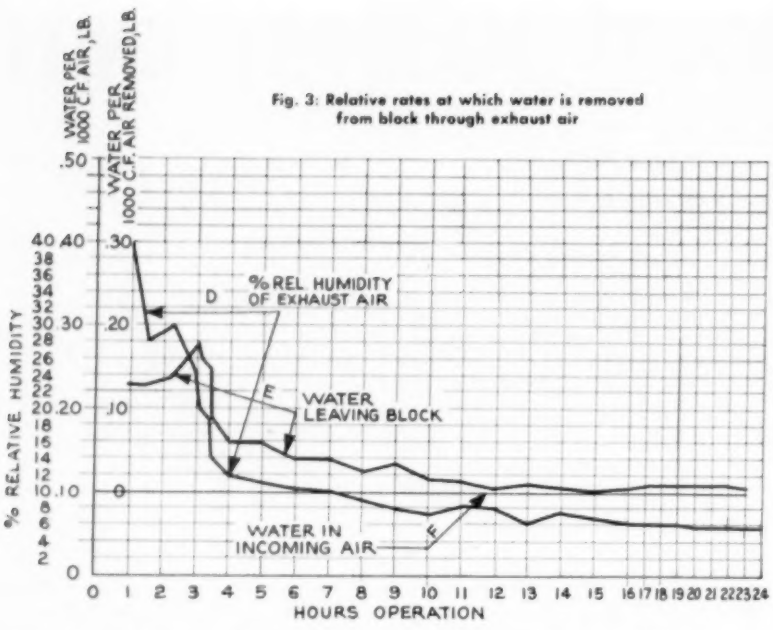


Fig. 3: Relative rates at which water is removed from block through exhaust air

mounted on the kiln sides and one section of finned radiation located at the inlet of the blower. The blower draws air from the top through the kiln roof and discharges this at rear into the kiln through a roof opening. An opening at the suction end draws in fresh air; a short connection at the discharge end throws out an equal quantity of moist air. Without air replacement, no water would be lost and no drying takes place.

Block are laid up in a dry wall acting as a center partition, dividing the front from the rear of the kiln. All block are laid horizontal so that heated air may travel from one side to the other through the block, coming in contact with the greatest surface area of block.

Readings

Readings of temperature and percent relative humidity were taken regularly at hourly intervals and noted on a test report sheet. Curves were charted of these readings and indicate: relative percent humidity of air entering blower, relative humidity of exhaust air, temperature inside kiln, and temperature of entering air and exhaust air.

In Fig. 2, curve A indicates temperature of the air in the kiln, which roughly approaches block temperature; curve B indicates the temperature of exhaust air. It is lower than kiln temperature because of heat losses traveling through the duct to the outside. Curve C indicates the temperature of air entering the kiln. In Fig. 3, Curve D represents relative humidity of exhaust air; Curve E represents amount of water per 1000 cu. ft. of exhaust air, based upon relative humidity percentage and temperature of outgoing air. These data are obtained from standard hygrographic charts. Curve F represents the water in the air taken in at the fan inlet per 1000 cu. ft. brought in and taken out. Hygrographic charts furnish this information.

From the curves in Fig. 2 and 3, it is possible to calculate the relative amount of water lost during each of the entire 23 hr. of the drying cycle. Although no information was known about the amount of water actually exhausted from the kiln, the readings of percent humidity, that is the water content of the exhaust air, were known from hour to hour. The rate of water loss would therefore be exactly proportional to the water content of the exhaust air. It was therefore possible to plot such a curve.

Before plotting such a curve, it was necessary to deduct from the readings made the amount of water included in the supply of fresh air to the kiln. The difference between water in the fresh air and water in the exhaust air would be the water removed from the block. In plotting, an arbitrary point was located as ordinate at zero hours. At one hour later, another point was located, situated lower by the amount of water per 1000 cu. ft. of air. In this case, it was 0.13 for the first hour's operation, then 0.14 for the second hour's operation, then 0.18 for the succeeding hour and so on till the end of the 23-hr. run.

In this manner another chart is obtained (Fig. 4). This indicates the rate at which water was taken from the block during each succeeding hour of operation. This is a useful curve since it indicates so explicitly that the rate of loss of water is highly variable, rapid at first and toward the end of the run extremely low and almost negligible. Subsequent tests on six dried block, picked at random, showed an initial water content of 60 percent at the start of the test and 12 percent water content at the finish (average). With this information it becomes apparent that it is possible to set up a scale for moisture percent against hours operation and hourly loss of water (see percent humidity curves) as shown on the chart. Thus water loss may be known for any period of test run and it is easy to state what degree of percent moisture prevails after any length of time.

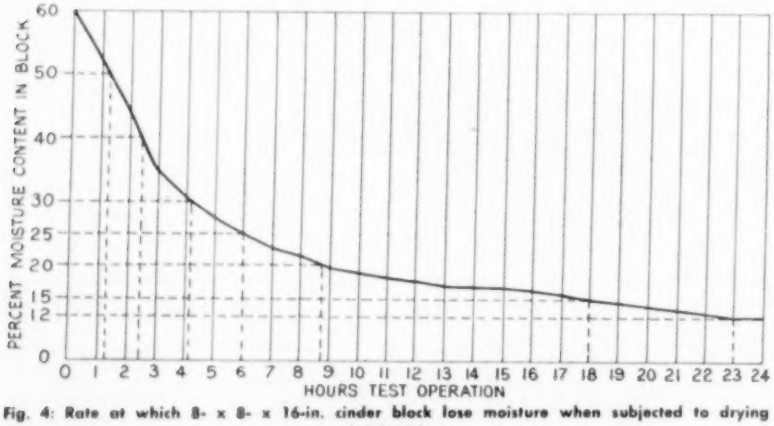


Fig. 4: Rate at which 8- x 8- x 16-in. cinder block lose moisture when subjected to drying treatment

Conclusions

The chart applies only to cinder block 8 x 8 x 16 in. and weighing from 32 to 33 lb. each; also for a temperature of 175 deg. F. reached after 3 hr. with a gradual rise to 196 deg. F. at the end of 23 hr.

If temperatures are raised at a more rapid rate, drying will be accelerated. For a slower temperature rise and lower final temperature, drying will naturally be at a lower rate. Higher temperatures may be reached in shorter time with greater heating facilities, combined with a greater number of air changes of recirculating air.

It is also possible to prepare similar curves for different temperature and air conditions and such check operations should prove highly valuable.

(Continued on page 154)

SLUMP CONCRETE BRICK INTRODUCED IN EAST

RAINBOW ROCK is a slump concrete brick recently introduced at the Philadelphia Home Show by General Engines Co., Gloucester, N.J. Although similar products have had scattered use in Florida, and have been sold in New England, the heavily populated Eastern area had apparently never seen anything like it before.

Essentially, a solid wall of Rainbow Rock presents a face of varied size brick. Each brick is 2 ft. long, 4 in. wide, and is available in three thicknesses: 1½, 2½, and 3½ in. The brick come in a variety of soft pastel colors, including pink, grey, yellow, and a blended brick that combines yellow and pink. The colors are fast and durable, and it is said that they will not fade or wear away. Rainbow Rock brick can also be furnished in any blend or colors the customer wishes.

Walls of Rainbow Rock can be laid up of single size brick in one or many colors or a variety of sizes. The brick, which are cast like concrete block, can be broken by the mason into random lengths of his choice.

Walls laid up of these units are much less costly than with conventional brick, for two reasons. First, the cost of the average unit of Rainbow Rock is only about one-half the cost of a similar unit in face brick, which would be approximately three brick long. Second, because the Rainbow brick are longer, the mason can save at least one-third of the laying time over an equivalent wall of brick.

Savings in cost of material and savings in expensive labor time are probably sufficient to have caused the interest of Philadelphia home builders, but the fact that the finished wall is more beautiful and modernistic than brick makes this new product even more desirable. Rainbow Rock is one of the answers provided by the building material industry to combat today's high costs. Actually, the mix for Rainbow Rock, and the machine to cast it, were developed nine years ago during a slack season at the General Engines Co. plant in Gloucester. The machine was almost forgotten during the war years, and the busy years immediately following, when the company was harassed by material shortages. During these years the company was trying to keep up with the demand for its principal product, a concrete block machine.

However, as the cost of building material and the cost of skilled labor increased, the company saw a real need for the almost forgotten Rainbow Rock. It was decided to test the public interest at the Philadelphia Home Show. The response was far greater than anticipated.

General Engines Co., as a manufacturer of block making machinery, is primarily interested in marketing the machine to make Rainbow Rock. However, quite a few of Rainbow Rock sales have resulted from the Show, and the company is acting as its own pilot plant to handle the sales. The company plans to produce enough Rainbow Rock to fill these and subsequent orders, until orders can be turned over to local dealers using the Rainbow Rock machine.

The Rainbow Rock machine itself can be driven by 1-hp. electric motor or gasoline engine. The mix is poured into the mold box, where it is vibrated. The green brick is removed on a pallet, which can be cut from 2- x 4-in. lumber. The brick is made wet enough to slump as it is stripped from the machine. During the curing process, the outer surfaces round from the center of the block itself, forming a beautifully curved outer edge. The brick are cured and ready for shipment 72 hr. after casting. Then the pallets may be removed and reused.

The machine for producing Rainbow Rock is 48 in. high and 36 in. long. It is constructed of heavy plate and angle iron, electrically welded throughout. Although the machine can be operated by one man, the company recommends the use of two men during a run. On actual tests, two men, over several runs, have averaged about 1500 brick in an 8 hr. day, with the average cost to the customer (depending on size and color) about 22 cents per unit.

The company has developed a formula for each color. Too much water in the mix will delay the curing period, tie up the pallets, and increase the amount of slump in each brick. Too much sand would cause the brick to crumble, and would prevent reaching the 1500 p.s.i. designed compressive strength.

Present selling price of the machine, complete with 1-hp. electric motor, is $750 f.o.b., Gloucester, N.J. Use of the Rainbow Rock trademark is offered free to purchasers of the machine.

Plant Expansion

IDEAL READY MIX CO., which operates plants in Ottumwa and Oskaloosa, Iowa, has added a new line of supplies to its ready-mixed concrete business, which includes plaster sand, mason sand, gravel, concrete culverts for crossings, expansion joints for sidewalks and drives, concrete floor hardeners, reinforcing wire mesh and plywood sectional forms.

Ideal Ready Mix Co. has grown to be one of the largest ready-mixed concrete companies in southeastern Iowa. The company attributes its success to the quality of its product, prompt delivery and carefully planned advertising promotion. The company uses newspaper, magazine, radio, direct mail and billboard advertising.

●

MCHENRY SAND AND GRAVEL CO., McHenry, Ill., is establishing a ready-mixed concrete plant at Hainesville, Ill. Production facilities for concrete building units are to be added later.

Slump brick provides a modern effect in this New England home. The units were manufactured by Plasticrete Corp., Hamden, Conn.

Officers and directors of the Ohio Ready Mixed Concrete Association buckle down to work and raise the temperature 10 deg. Seated, left to right, are J. A. Radebaugh, Lancaster; J. A. Nicholson, Toledo; L. A. Kemter, Cleveland; and Claude L. Clark, association secretary, Columbus. Standing, left to right, are Herbert Rusk, Mansfield; George Frye, Dayton; Carl Schoaff, Akron; Ralph Anderson, Columbus; and C. A. Persons, Elyria

Ohio Ready Mixed Concrete Association holds informative panel discussion. Building sound customer relations through courtesy, service and quality of product emphasized; advertising and publicity discussed

BUILDING SOUND READY-MIX BUSINESS

THE ANNUAL MEETING of the Ohio Ready Mixed Concrete Association always commands a large turnout. This year's meeting, held July 22-23 at the Hotel Hollenden, Cleveland, was no exception. Over 100 members and guests were present at the luncheon to hear Vincent P. Ahearn, executive secretary of National Ready Mixed Concrete Association, give his always enlightening report of industry and national affairs. A feature of the meeting was a panel discussion on the subject "Evaluate Your Product," led by Norm Wagner, P.C.A. district engineer, as moderator. Reports of the officers and secretary rounded out the program. On the social side, members attended an evening double header baseball game between the Cleveland Indians and the New York Yankees. It took the next day's meeting to dispel the gloom.

The first session was called to order by president Herbert Rusk, Mansfield. His report covered the period between the interim meeting held in Chicago in February during the N.R.M.C.A. meeting, and the middle of the year. With regard to the Chicago luncheon, Mr. Rusk said that the attendance was the highest ever reached, in fact, 30 or 40 people had to be turned away for lack of seating facilities. The cement shortage presented a more immediate problem, Mr. Rusk continued. Three association board of directors meetings were held to consider the problem, one a joint meeting with the Ohio Concrete Masonry Association to work out mutual supply needs. A factor in the near future cement picture will be a 10,000,000 bbl. demand for construction of the Ohio turnpike. Funds were recently allotted for the initial stages of this highway.

Mr. Rusk reviewed his year as president, during which time four new active members and four new associate members joined, bringing the total membership to 113, of which 88 are active and 25 are associate members. His term in office resulted in a few ideas which might benefit the association, Mr. Rusk noted. He suggested: (1) institution of a safety contest; (2) a technical committee or a technical serviceman to handle local problems; (3) investigation of the difference of opinion existing in the state highway department with respect to specifications for production of concrete (this suggestion arose from Mr. Rusk's experience in being refused a contract for one section of state highway because he did not have a revolution counter on his central mixer, while at the same time he was delivering concrete to another section with the same equipment); (4) a review of the association dues structure; (5) formation of a membership committee; (6) a look into the possibility of holding regional meetings throughout the state to cover local problems, and (7) a revision of existing by-laws.

Secretary's Report

The annual report of the secretary, Claude Clark, outlined his activities during the past year, and plans for the current year. Ohio legislation brought some comments from Mr. Clark. Voters in the state will vote on a constitutional convention soon. Proponents have in view reapportioning legislature seats. In Mr. Clark's opinion this would not be advantageous from industry's viewpoint. An action by the state was advantageous, however, for the basic rate for Workmen's Compensation Insurance was reduced 2 cents per $100 of payroll (on Manual Code 8205). This is a reflection of the increased safety consciousness on the part of ready-mixed concrete producers, though Mr. Clark urged all to be even more careful; each accident affects the rate for all companies.

V. P. Ahearn, executive secretary, N.R.M.C.A., again presented an enlightening view of industry and national affairs

Bond issues in the state have been approved for a total of $75,000,000 of construction this year, Mr. Clark stated. Most of this is for schools, though highways account for $12,000,000. Sixty-six bond issues have been voted on already, with many more coming up for vote this Novem-

Left: A panel discussion brought these men to the podium. Moderator Norm Wagner, Portland Cement Association, is speaking, and others, left to right, are G. V. Lewis, A. L. Chapman and E. E. Osborn. Right: The new president of the Ohio association, L. A. Kemter (Goff-Kirby Co., Cleveland), right, standing, receives the congratulations of the past president, Herbert Rusk. Seated at left is C. A. Persons and at right, the association secretary, Claude Clark

ber. Though only 55 percent affirmative vote is required, many of these may not pass unless those interested work to put them over.

The state attempted to enact a truck weight-distance (ton-mile) tax, but failed. Instead, vehicle license fees were raised. Many state and county officials associations have endorsed an additional gas tax for road and street purposes. The ton-mile tax is not dead yet, Mr. Clark pointed out. But the large amount of bookkeeping and excessive tax that would result are bringing many to fight it, he said. This piece of legislation is now the most important one before the state, according to the secretary.

Mr. Clark attended the safety awards presentation of the W. E. Anderson Sons Co. in Columbus recently. What he saw made him feel that the entire industry could take a page out of this company's book. The association, Mr. Clark said, could well profit by following the Anderson public relations program. Though it is the duty of each company to make evident the hidden qualities of concrete, he suggested that the association could wisely embark on a broad, statewide public relations program.

Concrete School

Last March, the Ohio Ready Mixed Concrete Association held a Concrete Short Course at the University of Akron. A description of the subjects covered and other pertinent information about the school was given in an informal report by Russell Mumford, Springfield. One of the requirements of the school was that all course material be printed. Altogether 120 students attended the school, representing 47 companies; 157 attended the banquet. The Portland Cement Association furnished some speakers, films and course material, as did the University of Akron. An invitation from the University of Toledo was read, suggesting that the association hold the 1953 Short Course at that institution. The members agreed unanimously.

"Evaluate Your Product"

The moderator of the panel discussion, Norm Wagner, introduced the other members, Arthur L. Chapman, Clifton Coal & Supply Co., Cleveland, who discussed plant control; G. V. Lewis, W. E. Anderson Sons Co., Columbus, whose subject was "Proper Handling of Concrete on the Job Site;" and E. E. Osborn, Clinton Construction Co., Wilmington, who discussed advertising and publicity.

Mr. Wagner, by way of starting the discussion, listed the four essentials of good business: (1) courtesy, (2) good service, (3) quality and (4) advertising and publicity. He asked that companies check to determine whether too much attention is being given to good customers while others are neglected. Then he asked "Do you have a card file of prospective customers? Are you analyzing service given to customers?" Elaborating on this last point, Mr. Wagner suggested that producers go out on the jobs being placed and see if everything is going satisfactorily—it impresses people to see others concerned with their welfare. He had more rhetorical questions to ask. "Are you keeping cost data? Are your personnel attempting to cultivate new buyers, especially contractors?" Cost data will help prove to contractors and builders that ready-mixed concrete is more economical than some competitive material.

Another suggestion Mr. Wagner made called for the establishment of a company educational program for employes. This will help build up their morale and their knowledge of materials, he contended. He also suggested some sort of educational program for the buyer of concrete. The importance of this is evident from the frequency with which ready-mixed concrete producers are blamed for mistakes made by the buyer. Similarly, architects, engineers and city officials could use proper information. It is a good idea to get up a leaflet or distribute literature to small users of concrete, showing proper ways of using and handling concrete.

Mr. Chapman described the controls used at the Clifton Coal & Supply Co. plants, where he is concrete technologist. Yield, air content, slump and total proportions of aggregates are controlled. Tests are made for unit weight of stone, fineness modulus of sand, air content and unit weight of concrete. Slump is recorded on a wattmeter. A chart is used for mix proportions, good for any specific gravity. Mixes are designed for Type I cement, and to use the same amount of air-entraining agent per cubic yard (for all regular mixes). All tests are run in a small lab on the mixer floor, except for sand gradation tests which are run in a ground floor lab where vibration is less.

Normally the producer has no control over material after placement, Mr. Lewis began. But this depends on the type of purchaser. These fall into three groups: contractors, small contractors or concrete finishers, and the small buyer or the individual. The first usually presents no problem. Lack of know-how or negligence sometimes plagues the second group. But the third group, Mr. Lewis pointed out, usually has no experience or at least little to help him place concrete properly. Special attention should be given to these groups on such points as forms, well-prepared subgrade, placing technique, finishing, and curing and protecting, the speaker said. Most problems encountered could be solved with just a little bit of knowledge by the buyer.

Advertising and Promotion

The advertising and promotion methods of Clinton Construction Co., described in considerable detail by Mr. Osborn, elicited considerable interest, indicating the need producers feel for this aspect of business. Mr. Osborn's company has a combination ready-mixed concrete and concrete block plant. Much concrete is sold to contractors, but the majority is sold for farms and homes. This requires a fairly ambitious advertising program.

One of the simplest but most effective advertisement is clean, well-painted trucks, he said. The seven trucks are painted red with white letters. A lot of business has resulted

from the visibility thus afforded, Mr. Osborn maintained. However, the best part of the program has been newspaper advertising.

Originally mats provided by P.C.A. were used for the ads. Though these are still sometimes used, Mr. Osborn chiefly uses photographs he has taken of actual jobs the company has worked on. He then orders engravings and writes copy for the ads. Mr. Osborn had a number of practical suggestions about preparation of ads. In the first place, he said, get your advertising copy to the newspaper at least 10 days before publication in order to get the best attention by the paper. He writes the copy himself for accuracy rather than leave that to newspaper employes unfamiliar with the details. Advertisements are run as often as four times a week, for keeping the company name before the public is considered important. The advertising budget amounts to about 1 percent of total sales of both block and ready-mixed concrete.

The effectiveness of Clinton's newspaper advertising has been indicated by inquiries and by the many people who follow jobs by the pictures in the ads, Mr. Osborn said. A suggestion the speaker had to make if ads were to be rerun, was to have a number of mats made of the original ad.

Though the company gives away literature, the small plastic slide-rule type of giveaway used for determining yardage requirements was deemed too expensive. Instead, a sheet was prepared listing all these data in tabular form. Now any number can be given away at a very nominal cost, Mr. Osborn pointed out. Mason's line blocks are given away, primarily to contractors. But one printed piece often overlooked by producers is invaluable. This is a printed price sheet. Also very valuable are printed specification sheets. These save much time and explaining when inquiries are received.

Hot Cement

A number of questions were raised in the open forum about hot cement. Though no one had endeavored to cool cement or precool water, Jim Nicholson said he had tried retarders but gave them up because of cost. His only cooling method is to wet down coarse aggregate stockpiles. A statement by one producer that an engineer had told him hot cement does not cause concrete failures brought comments from Mr. Nicholson on his experience before and after a cement strike. Hot cement delivered before the strike gave 400-500 p.s.i. lower 28-day compressive strengths than the cool cement received following the strike.

A capacity crowd braved the steamy hotel ballroom to hear Vincent Ahearn talk at the annual luncheon. He told about plans for the 1953 annual N.R.M.C.A. convention in San Francisco and invited nonmembers as well as all members to attend. Then he summarized the results of the first survey of the ready-mixed concrete industry, covering all producers on record, members and nonmembers alike. An article giving survey data can be found on page 148 of this issue.

National Affairs

Labor agreements signed by some companies were blasted by Mr. Ahearn. As an example, he reported a city-wide agreement signed in a Western city which permits a closed shop, an illegal provision. Unions have no use for a man who enters into a contract which is clearly illegal, according to the speaker. In another case, the employer permitted jurisdictional disputes to be referred to an organization that went out of existence 10 years ago. How, Mr. Ahearn reiterated, can you expect unions to respect employers who sign such agreements? In still another case, and this one recurs with shocking frequency, a clause is inserted into the contract "any dispute must be referred to arbitration." There is no contract here, Mr. Ahearn pointed out, only a day to day agreement, for the union can open up negotiations at any time on but a slight issue. To counteract these irresponsibilities employers should read and understand a contract before signing, and if an "expert" is assisting in making out a contract, be certain this man has the producer's interest at heart, cautioned the speaker. In other words, don't be a pushover.

Price controls will probably remain as long as the present law extends (to April 30, 1953). Thus some of the recent provisions are important, among which Mr. Ahearn mentioned the provisions for adding extra cost of out-of-area cement and aggregates. Lately, inbound extra costs of these materials can be added, up to 4 percent.

Many producers have no contract or quotation forms, Mr. Ahearn has discovered, but worse yet, a large number have no adequate cost determination method. Thus it is clear that companies do not know their costs, as was shown in gathering data for price control relief. Mr. Ahearn emphasized the seriousness of running a business without having these facts available.

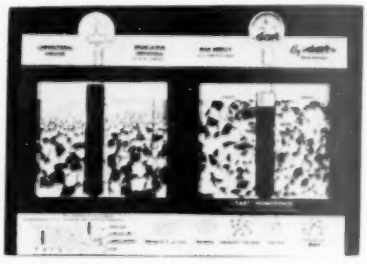
The speaker had much to say about the steel strike and its effect upon the U.S. economy. (Settlement of the strike was reached two days after Mr. Ahearn spoke.) The strike spoke poorly of private individual's ability to reach an agreement. As a result, he feels that Congress may yet write a law forcing arbitration. As for politics, always a favorite subject, Mr. Ahearn advised the foes of President Truman that "since we're taught to love, and if you want to love someone, love Mrs. Truman," for she is the reason the President will not run for office again. Mr. Ahearn's prediction of Stevenson's nomination has turned out to be correct. He would not go out on a limb and predict the outcome of the November election, however. But the Democrats, in spite of their record of corruption, toleration of communism and foreign bungling are still in a good position to win, he said. The Republicans face a terrific battle. The speaker had praise for both Ohio senators, Mr. Taft for his part in the Taft-Hartley Act, and Mr. Bricker for his sponsoring of a little-known proposed amendment to the U.S. Constitution to make it illegal for the President of the United States to enter into agreements with foreign governments if these would change domestic laws and policy.

Election of Officers

New officers of the Ohio Ready Mixed Concrete Association, elected at the luncheon business meeting, are L. A. Kemter, Goff-Kirby Co., Cleveland, president; J. A. Nicholson, vice-president, and Stephen Stepanian, treasurer. Directors are Herb Rusk; George Frye, Dayton; Charles Dittrich, Cincinnati; John Mueller, Youngstown; C. F. Shoaff, Akron; and John Radebaugh, Lancaster.

Concrete Vibration

THE DEVELOPMENT of a method of visual explanation of the principal of concrete vibration has been announced by Dart Manufacturing & Sales Co., Denver, Colo. An animated display board shows the difference between conventional concrete vibration and the Dart high-frequency, controlled amplitude vibration.



As the vibrator head is put in motion, the display shows high and low pressure areas

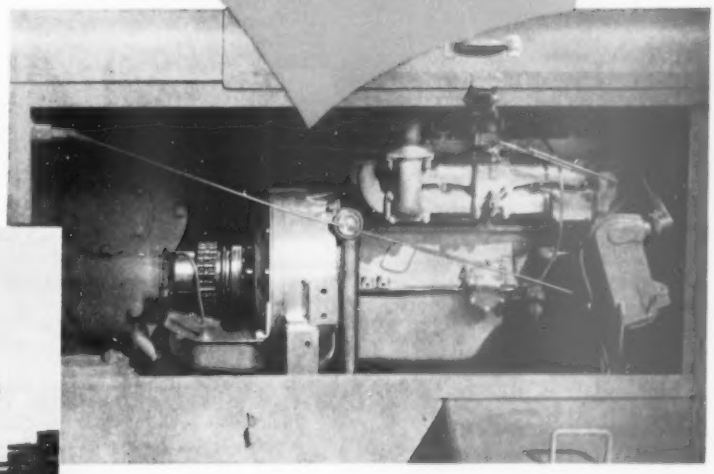
One section of the display shows dangers of segregation of aggregates due to over-vibration, while the other section shows how high-frequency, controlled amplitude vibration causes the vibrator head to remain in continuous contact with the aggregate. As the vibrator head is placed in motion, the display reveals high and low pressure areas.

The new vibrator head featured by the company is claimed to give amplitude-frequency combinations never before attained in the vibration field, and that the new head makes possible the placing of even lower slump concrete than ever before, with the aggregate forming an exceedingly close bond in the smallest cracks without segregation.

Announcing UNIT with FLUID TORQUE DRIVE

To a long line of improvements in design and construction, UNIT has added another advancement — FLUID TORQUE DRIVE. This torque converter application gives the operator a steady flow of power which he can regulate with smoothness and accuracy. Elimination of shock loads adds life to bearings, shafts, gears, and cables . . . brings maintenance costs down to a minimum. Excavating work is done with a strong steady flow of power, with no "stall" and no "delay" while the engine regains speed. Crane work can be done with greater smoothness of operation by throttle control.

UNIT offers the Chrysler Torque Converter as a standard installation at no extra cost on ½ yard machines equipped with 6 cylinder Chrysler Industrial Gasoline Engines.



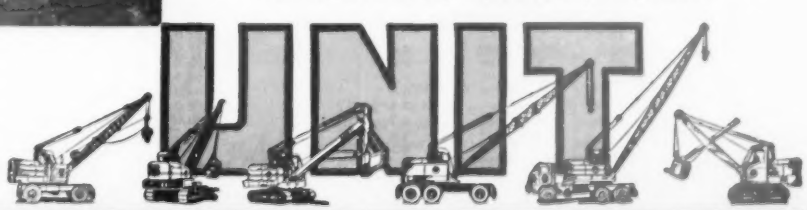
SM-O-O-THER PERFORMANCE — Smoothness of operation is achieved in traveling as well as in lifting and digging. The Torque Converter in Mobile equipment allows for smooth break-away performance.

Time-saving, Cost-reducing Advantages

- Greater work output without increasing fuel consumption
- Eliminates "shock loads" on machinery, reducing maintenance cost
- Smoother and more accurate control of all operations
- Builds up line pull without excessive load on engine
- Full steady power for peak loads without stalling engine
- Quick engine pickup retains maximum line speeds
- Provides "regulated load handling" by throttle control
- Increases lugging power for hard excavating
- Engine clutch eliminated entirely
- Installation available at NO EXTRA COST

UNIT CRANE & SHOVEL CORP.
6431 W. Burnham St., Milwaukee 14, Wis., U.S.A.

Other UNIT machines are available in ½ and ¾ yard Excavators and Cranes up to 20 Tons . . . Crawler or Mobile Types . . . Gas or Diesel . . . Fully convertible to ALL attachments. Write for descriptive literature.



SHOVELS • DRAGLINES • CLAMSHELLS • CRANES • TRENCHOES • MAGNETS

A 7199-1PC

N.R.M.C.A. Completes First Ready-Mixed Concrete Survey

THE NATIONAL READY MIXED CONCRETE ASSOCIATION recently published the results of its survey of ready-mixed concrete production and value in 1951. The survey, which was inaugurated this year for the first time, is to be an annual activity of the association.

Questionnaires were sent to 1635 ready-mixed concrete companies in the United States, 535 of which were active member companies. Returns were received from 691 companies, 384 members and 307 nonmembers, or from 42 percent of the companies to whom the questionnaire was sent. The association has summarized the results of its survey as follows:

The reporting companies produced 37,760,191 cu. yd. of ready-mixed concrete in 1951. In dollar value, this amounted to $424,136,796, with an average value of $11.23 per cu. yd. (Table I).

Table I. Quantitative breakdown of materials used in ready-mixed concrete

Companies reporting	691
Cu. yd. of concrete	37,760,191 cu. yd.
Total value	$424,136,796
Portland cement	50,873,199 bbl.
Sand	27,218,748 tons
Coarse aggregate	35,911,177 tons
Average production	54,646 cu. yd.
Median production	27,400 cu. yd.
Average value	$11.23 per cu. yd.
Average portland cement	1.35 bbl. per cu. yd.
Average sand	0.72 tons per cu. yd.
Average coarse aggregate	0.95 tons per cu. yd.

Earlier in the year, the association had estimated that the ready-mixed concrete industry had consumed 50,000,000 bbl. of cement in 1951, which was approximately equivalent to the cement consumption figure reported by the 691 companies who participated in the survey. The accuracy of the association's estimates also held true in several other phases of the survey. For example, the association had estimated ready-mixed concrete production last year at 38,000,000 cu. yd., valued at $450,000,000, both figures being close to the survey results. It is believed that the companies who participated in the survey are responsible for the greatest bulk of the annual ready-mixed concrete production, and that those not answering the questionnaire represent, in the main, many small companies, including many which engage only irregularly in the industry. Although this is only an assumption, it is expected that the results of future surveys will show whether the association's analysis is an acceptable figure for the entire industry.

The reporting companies used over 27,000,000 tons of sand and nearly 36,000,000 tons of coarse aggregate, according to the report. The average production was over 54,000 cu. yd.; the median production, 27,400 cu. yd. Average consumption of portland cement per cu. yd. of concrete was 1.35 bbl.; average consumption of sand was 0.72 tons per cu. yd.; and average consumption of coarse aggregate was 0.95 tons per cu. yd. of concrete.

Five companies produced over 500,000 cu. yd. of ready-mixed concrete in 1951, accounting for 12 percent of the total production (Table II). Twenty-seven companies were in the 100,000-125,000 cu. yd. range, producing 8 percent of the total production. The largest number of companies are in two brackets: 0-10,000 cu. yd. group, in which there are 128 companies, producing, however, only 2.1 percent of the total production; and the 10,000-20,000 cu. yd. group, in which 148 companies produced 5.9 percent of the total production.

Other data revealed in the report showed that, of the companies reporting, 185 have agitating equipment, with 2309 units in active operation and an average number of 12.5 units per company (Table III). Central mixing plants are operated by 198 companies which have 251 such plants, at an average of 1.3 plants per company.

Truck mixers are operated by 555 companies which have 7340 truck mixers in operation, representing an average of 13.2 units per company. Proportioning plants were reported by 504 companies which have 858 such plants in operation, with an average of 1.7 units per company. Thirty-one companies operate a total of 217 non-agitating units, with an average of 7.0 units per company. The number of agitators per central mixing plant reported was 9.6. The average number of truck mixers per proportioning plant was 7.8.

Table III. Equipment and plants in the ready-mixed concrete industry

Type	Companies reporting	Units reported	Ave. No. of units per co.
Agitators	185	2309	12.5
Central mixing plants	198	251	1.3
Truck mixers	555	7340	13.2
Proportioning plants	504	858	1.7
Non-agitating units	31	217	7.0
Ave. No. of agitators per central mixing plant			9.6
Ave. No. of truck mixers per proportioning plant			7.8

Table II. Distribution of production, by size of company

1951 Production (cu. yd.)	No. of companies	Production, cu. yd.	Percent of reported production	Percent of participating companies	Accumulated percents of totals: Production	Accumulated percents of totals: Companies
0-10,000	128	800,870	2.1	18.5	2.1	18.5
10,000-20,000	148	2,212,548	5.9	21.4	8.0	39.9
20,000-30,000	87	2,123,382	5.6	12.6	13.6	52.5
30,000-40,000	78	2,682,710	7.1	11.3	20.7	63.8
40,000-50,000	43	1,893,733	5.0	6.2	25.7	70.0
50,000-60,000	38	2,075,088	5.5	5.5	31.2	75.5
60,000-70,000	30	1,964,102	5.2	4.3	36.4	79.8
70,000-80,000	17	1,257,994	3.3	2.5	39.7	82.3
80,000-90,000	15	1,233,338	3.2	2.2	42.9	84.5
90,000-100,000	18	1,719,400	4.6	2.6	47.5	87.1
100,000-125,000	27	3,006,389	8.0	3.9	55.5	91.0
125,000-150,000	15	2,029,105	5.4	2.2	60.9	93.2
150,000-175,000	8	1,273,117	3.4	1.2	64.3	94.4
175,000-200,000	8	1,457,576	3.9	1.2	68.2	95.6
200,000-250,000	9	2,006,658	5.3	1.3	73.5	96.9
250,000-300,000	7	1,979,447	5.2	1.0	78.7	97.9
300,000-350,000	5	1,570,839	4.2	0.7	82.9	98.6
350,000-400,000	3	1,105,822	2.9	0.4	85.8	99.0
400,000-450,000	2	824,154	2.2	0.3	88.0	99.3
450,000-500,000	0	0	0.0	0.0	88.0	99.3
over 500,000	5	4,543,919	12.0	0.7	100.0	100.0
Totals	691	37,760,191	100.0	100.0	—	—

Fire Tests of Gunite Concrete

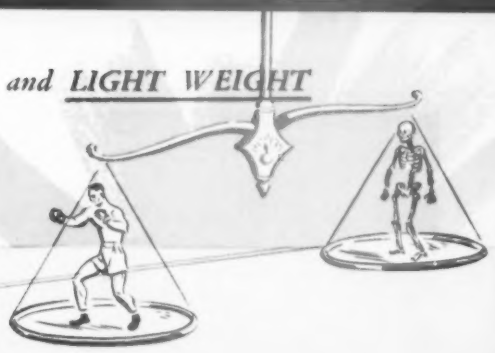
THE NATIONAL BUREAU OF STANDARDS has announced the publication of Building Materials and Structures Report No. 131, "Fire Tests of Gunite Slabs and Partitions," by Nolan D. Mitchell. The 11-page report contains the results of tests made at N.B.S. to investigate the properties of Gunite in slabs and partitions when subjected to standard fire exposures.

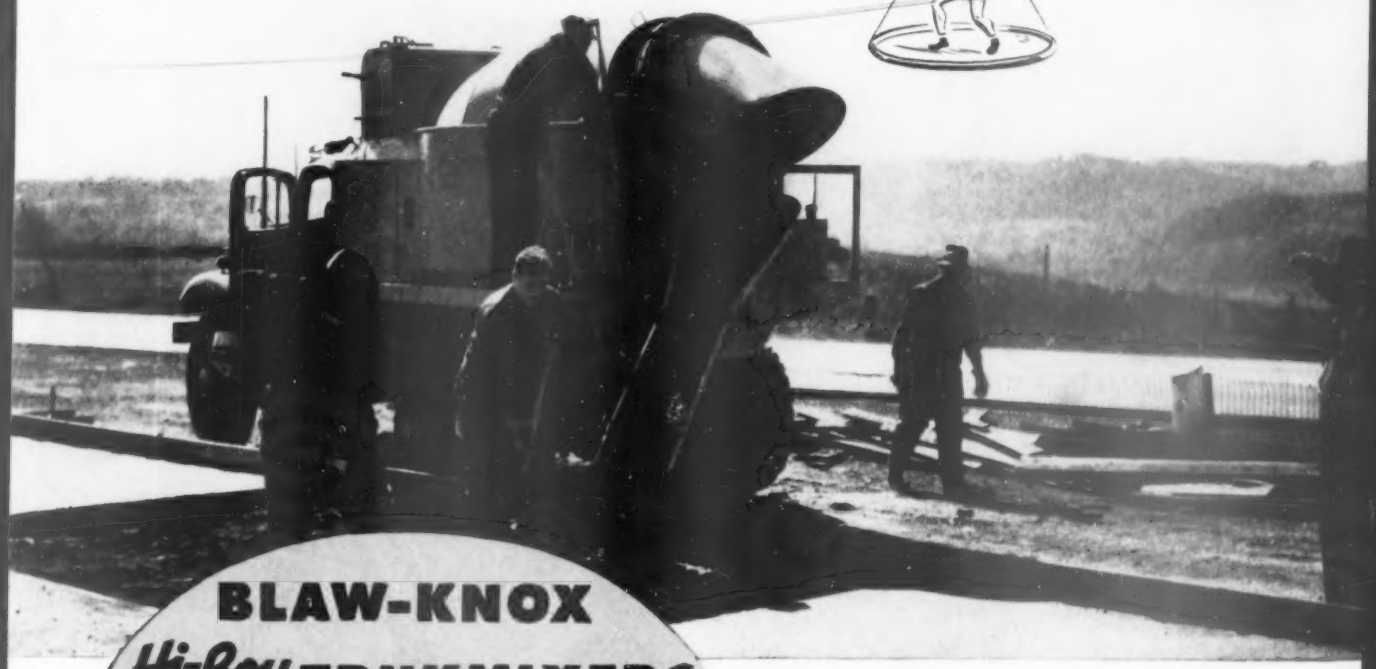
Eight slabs and four partitions made with Gunite concrete on wire-fabric reinforcement were subjected to the tests. The slabs were made with aggregates composed of sand and wood sawdust, the sawdust ranging from 0 to 50 percent by volume of the aggregate. Sand was used as the aggregate for two of the partitions, with the third having a minor amount of asbestos added, and the fourth contained equal volumes of sand and sawdust. The tests showed that fire-endurance limits for the slabs increased almost linearly with increased percentages of sawdust incorporated into the mix. Partitions made with sand aggregate only in the concrete, or with the addition of a small amount of asbestos fiber, showed early failure by spalling and holing through. The partitions containing sawdust in the aggregate showed greater fire-endurance limits.

Copies of the report may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C., for $.15 per copy.

There's a big difference between ***LIGHTWEIGHT*** *and* ***LIGHT WEIGHT***

The difference is in productivity. The Lightweight is *complete*, with the stamina, muscles and coordination to produce the winning punch. Like the Lightweight, Blaw-Knox Hi-Boy Trukmixers are *complete*, with every standard part light in weight but geared for knock-out production.





BLAW-KNOX *Hi-Boy* LITE-WEIGHT TRUKMIXERS ARE COMPLETE—

The *lightest weight Heavy-Duty truck mixers available

***3-cu. yd. Hi-Boy weighs 5580 lbs.**
***4½-cu. yd. Hi-Boy weighs 6830 lbs.**

● YOU'LL be payloads ahead when you use Blaw-Knox *lightweight* Hi-Boys on the job. They are *complete,* standard, heavy-duty units . . . not stripped down to the bone to cut the weight, but engineered to reduce weight to the minimum, with no sacrifice of strength and nothing left off that is necessary for efficient and economical operation. For instance, just one result of this careful redesign is that the thickness of the drum shell and mixing blades has been increased by 1 gauge, in the sections where the greatest wear occurs! Yet with all of the performance-improving features, the weight of the standard 3-yd. model has been reduced by a full ton and the 4½-yd. model by half a ton.

For hauling maximum payloads at legal load limits, with less operating cost and a lower overall capital investment, check on Hi-Boy advantages today . . . your Blaw-Knox distributor will gladly give you full details about the lightest weight, complete truck mixer on the market.

. . . Ask your Blaw-Knox distributor about the

26 HI-BOY FEATURES

that assure BIGGER PAYLOAD • HIGHER PRODUCTION • LOWER MAINTENANCE • EASIER OPERATION

Have you seen the BLAW-KNOX "Complete Package" of Ready-Mix Equipment?

It contains everything you need for a profit-making ready-mix setup . . . clamshell buckets, batching, mixing and charging plants, and Hi-Boy Trukmixers . . . all from one dependable source, on one order, with just one financial contact. Each piece of equipment is coordinated and balanced with the others to give you peak production with assembly-line efficiency. Ask your Blaw-Knox distributor to explain every advantage of "Complete Package" operation.

BLAW-KNOX

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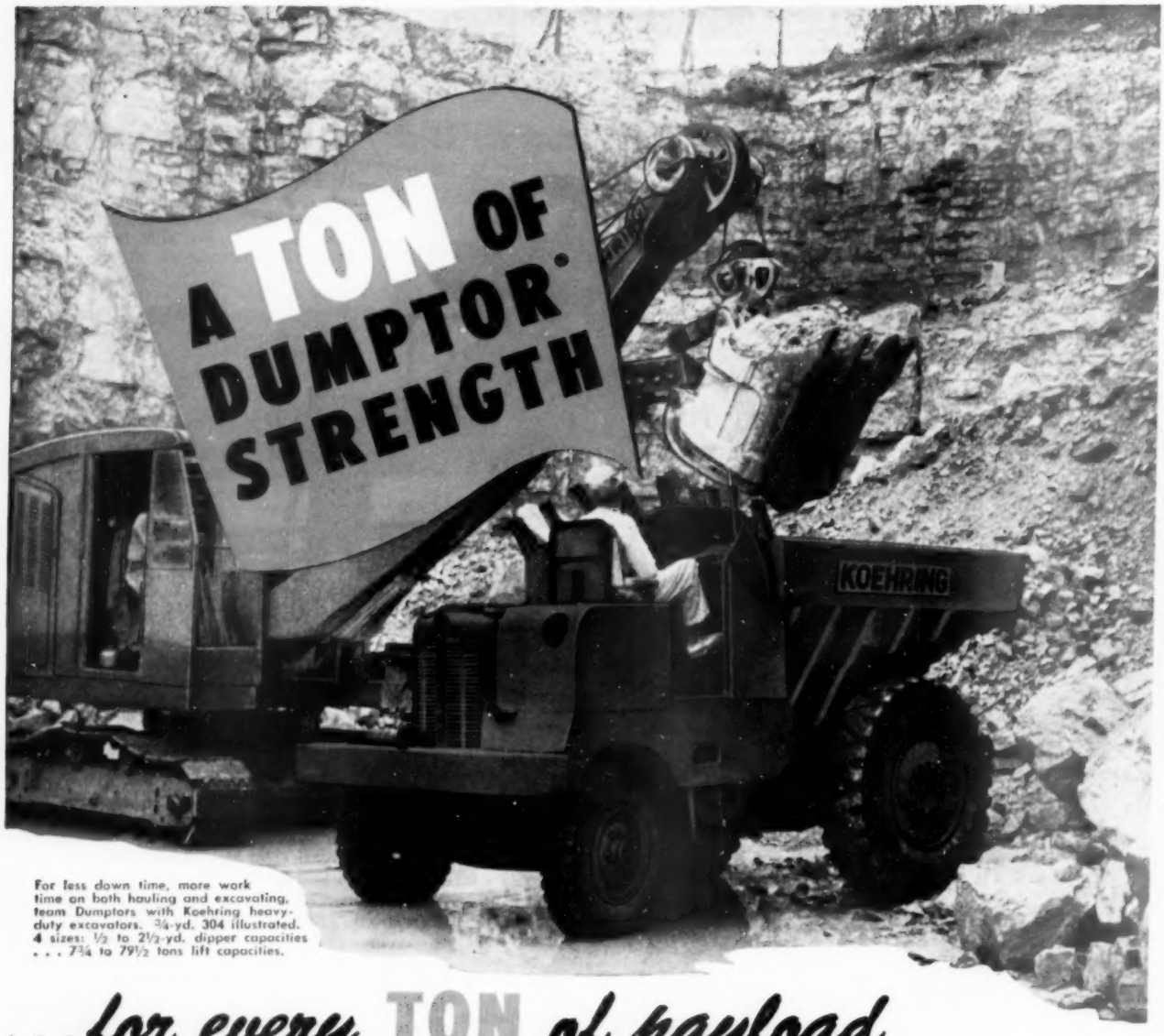


For less down time, more work time on both hauling and excavating, team Dumptors with Koehring heavy-duty excavators. ¾-yd. 304 illustrated. 4 sizes: ½ to 2½-yd. dipper capacities . . . 7¾ to 79½ tons lift capacities.

. . . for every TON of payload

Dumptors stand up under the severest shocks of shovel-loading 1½ to 2½ yards of rock at a pass because they're built extra tough for rock handling. There's more than a ton of net vehicle weight for every ton of payload.

All-welded body, sides, ends and bottom are heavily reinforced with 4" channel ribs. More than triple strength has been built into the bottom . . . seasoned 1⅝" oak timbers are securely bolted between two layers of 5/16" steel plate. Steel-oak-steel construction cushions shocks of rock loading. Free-swinging, kick-out pan adds another tough 3/16" high-manganese steel plate for extra protection. Dumptor also has: rugged main frame, 8" ship-channels, heavily trussed . . . one-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. All add extra strength to Dumptor chassis.

Heavy-duty construction like this assures you that Koehring 6-yard Dumptors will stand up under your toughest assignments . . . that there will be little down time with Dumptors on your job. For complete facts, see your Koehring distributor today.

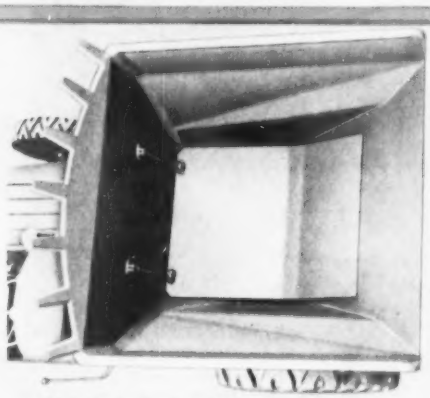
CK122

KOEHRING HEAVY DUTY

KOEHRING DUMPTOR®

KOEHRING COMPANY, MILWAUKEE 16, WIS. • SUBSIDIARIES: • KWIK-MIX • PARSONS • JOHNSON

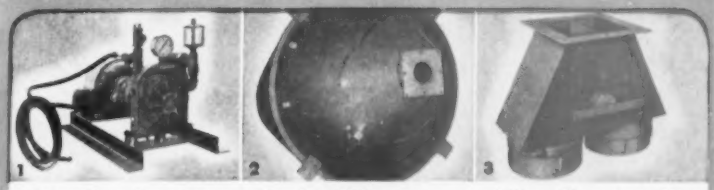
NO "SOFT SPOT" on Dumptor's underside . . . 1-piece, cast steel housing protects drive axle and enclosed chain drive. Wishbone supports the skid plate . . . shields the radius rod and the engine crank case . . . and supports the oscillating steering axle.



KICK-OUT PAN adds an extra 3/16" high-manganese steel plate on top of sturdy Dumptor bottom . . . breaks suction of sticky materials for fast, clean dump. Big 8' x 8' top gives easy-to-hit target for fast loading over the side or end . . . with less spillage.

1-SECOND GRAVITY DUMP . . . no slow-acting body hoists . . . no body-hoist maintenance . . . plus same speeds forward and reverse for no-turn shuttle hauling keep production yardage high, costs low with Dumptors.

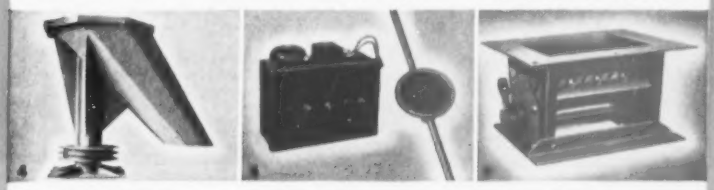
INCREASE BATCH PLANT PROFITS *with Johnson accessories*



1 **Rotary Vane Compressor** gives 7 cu. ft. air pressure per min. cement aeration. 15-lb.-limit relief valve.

2 **Aeration Fittings** properly spaced in Johnson bins and silos keep cement free flowing.

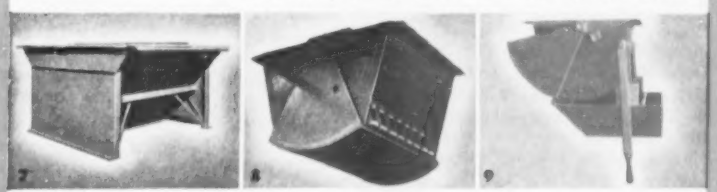
3 **2-Way Elevator Discharge Valve,** a flop-type chute, directs flow of cement to the storage tank.



4 **Pivoted Distributor** feeds aggregates to bin sections. Positions and locks by ground control wheel.

5 **Bin Signals** accurately register high and low levels in cement or aggregate. Dust-proof.

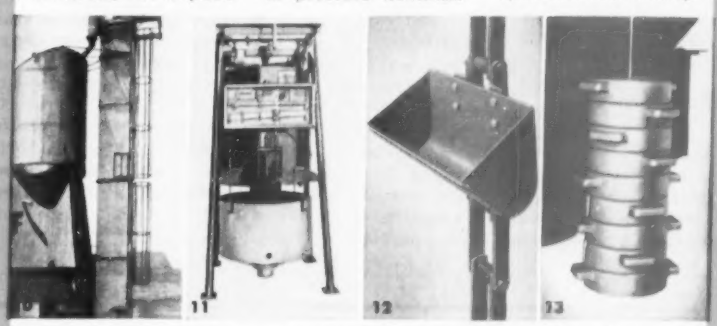
6 **Rotary Plug Valve** accurately controls cement flow. Plug operates freely in self-aligning bearings.



7 **Receiving Hopper** 30 and 50-bbl. sizes, feeds bulk cement to elevator. All-welded, weather-proof.

8 **Aggregate Fill Valves** single clam, radial type for jam-proof closing. Hydraulic pressure lubrication.

9 **Tunnel Gate** for stockpile reclamation. Single radial clam. Skirt board is hinged, opens and locks securely.



10 **Safety Cage** of 28" steel, welded to casing, can be furnished with all Johnson elevators.

11 **Water Weigh Batchers,** semi- or full-automatic types, 120 and 240-gal. sizes available.

12 **Elevator Buckets** in many sizes for aggregates, and cement. **Steel Chain** has carburized knuckles.

13 **Batcher Test Weights** in sets of nine, 50-lb. calibrated units, and two 25-lb. steel hangers.

Mail to **C. S. JOHNSON COMPANY**
CHAMPAIGN, ILLINOIS
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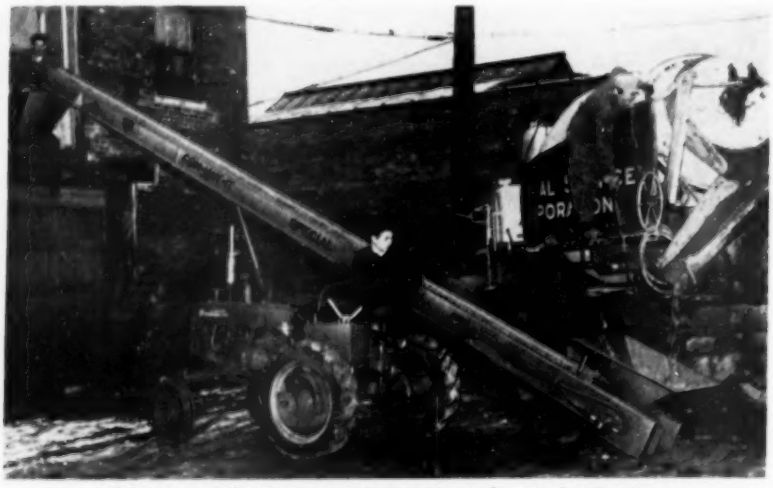
NEW MACHINERY



Tractor-mounted conveyor transporting concrete from truck to buggies

Tractor-Mounted Conveyor

AMERICAN CONVEYOR CO., 1115 West Adams St., Chicago 7, Ill., has introduced the Con-Vay-It Special 12-30 for mounting on both the International Farmall Cub and Super A. The conveyor is specially designed for handling concrete and building materials. Raised hydraulically and powered from the tractor, the conveyor will move concrete at the rate of 1 to 3 cu. yd. per min. The belt, trough, baffle plate, hopper and scrapers are said to be designed so that there is no segregation of the concrete nor fouling of moving parts.

Fog Nozzles

BETE FOG NOZZLE INC., 85 Pierce St., Greenfield, Mass., has announced a new line of stainless steel, fixed installation fog nozzles. The nozzles, the AA series, are smaller and lighter than previous models. A patented spiral principle of atomization is employed. The nozzles are available in six models, three flow rates (1- to 10-g.p.m. range), and with a full or hollow cone fog pattern. A ¼-in. male pipe thread connection is standard, with a ⅜-in. pipe thread available on special order.

Rubber Concrete Hose

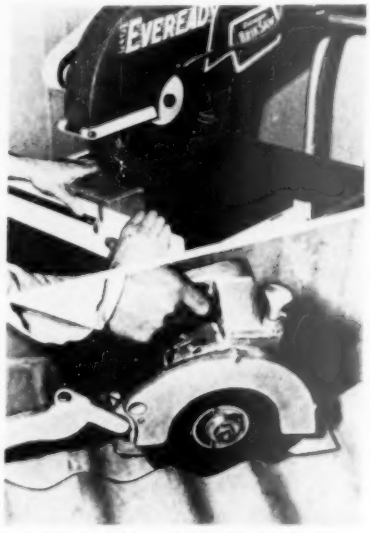
U.S. RUBBER CO., Rockefeller Center, New York 20, N.Y., has developed a rubber hose for the construction industry which can be used to transfer concrete from batch mixer to trucks. The hose is made in various sizes, ranging from 18 to 24 in. in diameter and from 18 to 36 in. in length. It is made of natural rubber reinforced with two plies of special fabric. In use, one end is attached to the bottom of the batch mixer and the other end hangs free over the hopper of the truck to be loaded.

Water Repellent

DEWEY AND ALMY CHEMICAL CO., Cambridge, Mass., has announced the start of national distribution of Daracone, a high silicone content water repellent for exterior masonry. It is said that this product penetrates the surface, leaving no film to wear away, peel or scale off; cannot be dissolved by water; and will not oxidize with age, having an effective life of from five to ten years.

Reinforced Masonry Blade

EVEREADY BRIKSAW CO., 1509 S. Michigan Blvd., Chicago 5, Ill., has developed the "Tuffie" reinforced masonry blade, specially suited to the cutting of concrete block, cinder block,



Masonry blades reinforced with fabric

most common brick and the softer ranges of stone. Reinforced internally with layers of strong fabric and a "safety web" molded into the blade surface, the blade is claimed to be virtually indestructible. Blade sizes range from 12 to 18 in. in diameter for masonry saws and 6 to 8 in. in diameter for hand power saws.

High Speed Production without Sacrifice of QUALITY
Smooth Trouble-Free Operation . . Maximum EFFICIENCY

when your Vibrapac is equipped with

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Write for your copy of new Booklet: "OSWALT SERVICE"

The constantly increasing number of our satisfied subscribers is proof of the lasting benefits and extra profits that go with the use of OSWALT SERVICE. Contact the nearest Oswalt-serviced plant . . . (Send for our list) . . . and ask the owner about the advantages of his Oswalt-serviced Vibrapac. Our business is built on SERVICE . . . and guaranteed results!

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COMMENT
from the BUTLER ENGINEER

Angelic Automatic Batcher Has Wings

A couple of months ago I told you about a terrific new baby born at Butler Bin — a highly complex, interlocked, completely automatic, mistake-proof, push-button control panel for batching 7 materials.

Now that baby has a brother. I know—I know! Nine months is the gestation period but we work miracles at Butler Bin — and nothing premature, either. Maybe we should change our name to Dionne Bin Co., un-Ltd.

But the baby's an angel. Actually has wings. He's built like this ⌓ instead of straight-away like this ▭. The wing design saves the operator many steps, saves space, speeds up work.

The baby's designed to batch ferrous ores of various kinds to stew up alloys. You can get an idea of the accuracy problem when I tell you that some of the ore chunks are big as Joe Louis' two fists — with the gloves on.

I was talking with a contractor on an earth fill job. Great trouble getting the specified density. Wrong type of soil. A salesman came in with a new kind of roller. At the end of his sales talk he said, "Mister, this roller'll give you 100% density."

"Sonny," said the contractor. *"The only 100% density I know about is when I've had too many martinis, a platter of french fries and a steak two inches thick!"*

And that goes double for —

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Overhead Lift Truck Guard

TOWMOTOR CORP., 1226 E. 152nd St., Cleveland 10, Ohio, has designed an overhead guard for Towmotor

Lift truck with overhead guard

fork lift trucks being used for high stacking of multi-unit loads. Constructed of 1½-in. and 2-in. steel pipe, the guard is recommended for use on lift trucks with a lift exceeding 144 in.

Tandem Axle Trucks

MEMPHIS EQUIPMENT CO., 766 S. Third St., Memphis, Tenn., is now supplying Army surplus tandem axle trucks with front wheel drive for transit mix mountings. Unused GMC 2½-ton 6 x 6 trucks have been converted to mount transit mixers up to 3½ cu. yd. Most trucks are offered with the canvas-covered cab only, but steel cabs are available.

Rear Engine Drive Truck Mixer

THE T. L. SMITH CO., 2835 N. 32nd St., Milwaukee 45, Wis., has announced a rear engine drive truck mixer. The engine has been mounted

Truck mixer with shorter wheelbase

at the back end of the truck over the rear axle to permit moving the mixer towards the front in order to keep payloads under maximum gross vehicle weight restrictions. This provides a shorter wheelbase truck and the engine and transmission are more accessible for maintenance.

You're Pleased
...because
you please your customers

when you offer them a choice of
23
different
CEMENT & MORTAR COLORS

Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

Cement Colors by Williams

Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

Mortar Colors by Williams

Here you have a choice of 5 different shades—one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.

Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

WILLIAMS
COLORS & PIGMENTS
C. K. WILLIAMS & CO.
East St. Louis, Ill. Easton, Pa. Emeryville, Cal.

Truly A Mobile Concrete Batching Plant

THE WILLARD WEIGH BATCH LOADER loads, weighs and transports multiple aggregates for three cubic yards of concrete from stock pile to transit or stationary mixers . . . this portable Willard plant has a capacity of 150 to 225 cubic yards of concrete per day.

WILLARD 3-yd. TRANSIT MIXER. Drives off truck engine.

Investigate the complete "Willard Way" of weigh batch loader, mixer loading conveyor and transit mixer. For Batching, Mixing, Transporting and Placing concrete.

Some contractor or ready-mix operator is working Willards near your location—let your Willard Dealer or ourselves tell you about Willards.

WILLARD CONCRETE MACHINERY SALES COMPANY
11700 Wright Road, Lynwood, California

Drying Masonry Units

(Continued from page 142)

A rough tabulation indicates these results in more compact manner.

Block can be dried from			
60%	to 50%	relative moisture content in	1½ hr.
60%	40%		2½
60%	30%		4½
60%	25%		6
60%	20%		9
60%	15%		18
60%	12%		23

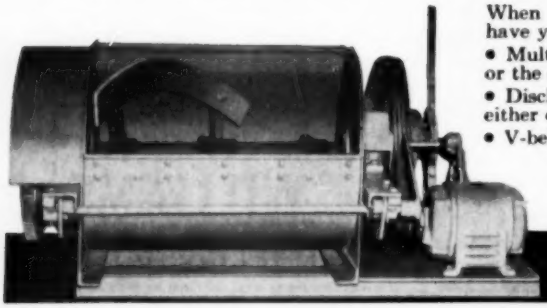
While there is no demand for block with zero percent moisture, it is interesting to note that tests and drying times to produce completely dry block require 48 hr. As mentioned previously, there is always the possibility of reaching a lower percent moisture more quickly through a greater supply of heat and air circulation. Actually the cost of fuel and air movement is not appreciably increased since this additional excess heat and power is used for a shorter period of time. Therefore there is no economy in prolonging the drying cycle beyond common sense.

The results of this test indicate most clearly that it is possible to bring block from 60 to 25 percent moisture content in 6 hr. Under these circumstances it should be possible to process three batches of block per 24-hr. day in one drying kiln. A kiln that holds 2000 block is about 24 ft. long, 9 ft. wide and 14 ft. high. With this kiln it is possible to dry 6000 block per 24-hr. working day. With the comparatively low cost of drying block (from $6 to $10 per 1000) and with the ever increasing demand for dryer block, making for better masonry construction, it is not unlikely that many block plants will install drying facilities in the not too distant future.

Pumice Block

B & V CORP., Salisbury, Md., has started the production of concrete block using pumice aggregate imported from Greece. The pumice is being shipped from Santorin Island in the Aegean Sea. There are now three companies on the eastern seaboard producing pumice concrete block.

only MULTI-MIXER gives you a choice!



When you buy Multi-Mixer you have your choice of:

- Multi-blade paddle arrangement or the conventional spiral blades.
- Discharge door in the rear or either end, controlled front or rear.
- V-belt drive or direct drive motor, and right or left hand drive.
- Special grill guards and dust proof covers.
- Rigid stationary mounting or portable mounting.

All Multi-Mixers are of welded steel construction, in standard sizes from 3 to 60 cu. ft., and larger sizes to your specifications. Ask for Bulletin MM-11. Multiplex also makes fully automatic block machines, skip loaders, and compartment aggregate bins.

MULTIPLEX Machinery Corp • Elmore, Ohio

Texas Industries' Expansion

TEXAS INDUSTRIES, INC., Dallas, Texas, has purchased Central Culvert Corp., of Alexandria, Shreveport and Monroe, La., and Universal Concrete Products Co., San Antonio, Texas, bringing to 14 the number of plants operated by the company.

Central Culvert Corp. produces ready-mixed concrete, concrete culverts and steel pipe at its Alexandria plant, and concrete culverts at its Shreveport and Monroe plants. Universal Concrete Products Co. produces lightweight concrete building units and concrete culverts.

Leslie D. Fain, general manager of Louisiana Lightweight Aggregates, Inc., Alexandria, La., (owned by Texas Industries) has been named head of the Central Culvert's plant at Alexandria. John W. Porter, manager of Texas Industries' Texcrete plant at Shreveport, La., will serve as general manager of Central Culvert's Shreveport and Monroe plants.

Charles Leake, who has been associated with Universal Concrete Products Co. for a number of years, will continue as general manager. The Universal company is said to be the largest producer of concrete block and culverts in the San Antonio-Big Bend area, producing approximately 400,000 lightweight, precast concrete block per month. The plant employs more than 60 people and operates a fleet of 15 delivery trucks.

Texas Industries, Inc., started its expansion two years ago when the company was still operating under the name of its predecessor, Texas Lightweight Aggregate Co. The company then owned a plant at Eastland, Texas. Ralph B. Rogers, president, and associates bought a controlling interest in the company and, since that time, have purchased aggregate plants at Stafford and Rosenberg, Texas, and at Alexandria, La. Other purchases include Texcrete at Dallas; Texcrete at Fort Worth; Texcrete at Natchitoches, La.; Texcrete at Austin; Texcrete at Corpus Christi; Texcrete of the Valley; and Texcrete at Shreveport.

Texas Industries and its subsidiaries produce more than 500,000 cu. yd. of expanded clay and shale aggregates annually, and approximately 15,000,000, 8- x 8- x 16-in. lightweight concrete block, in addition to concrete culverts and specialties.

Prestressed Concrete Pipe

IN A RECENT ISSUE of *Highway Research Abstracts* is a summary of an article published by *Magazine of Concrete Research* (England) which discusses the problem of discontinuity that often appears in some types of prestressed concrete pipe-joint construction.

As cited in an example, this problem arises where the pipe wall is given a tangential prestress of, say, 2000 p.s.i. by circumferential wires. The circumferential prestressing wires are

● *Seberger's Concrete Block Co., Gary, Ind., recently enlarged their plant by adding two 74' 18" Farquhar Model 346-2 Sectional Trough Conveyors to feed 250-ton storage hopper. This plant uses one portable and six permanent Farquhar Conveyors in all. (See quotes from letter, below.)*

"We look to FARQUHAR for our CONVEYOR needs!"

Here are quotes from a letter Farquhar recently received from Seberger's Concrete Block Co., Gary, Indiana: " In 1950, we completed 25 years of cement block manufacturing. As our facilities grew, we looked continually to your company to satisfy our conveyor needs. The satisfaction gained since our initial purchase 14 years ago (this first conveyor is still being used to feed our crusher hopper) has been always reaffirmed in subsequent purchases.

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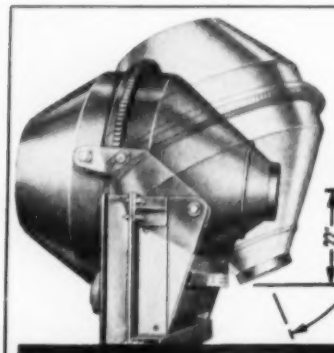

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frequently terminated at a distance of 4-6 in. from the end of the pipe, with the remaining non-prestressed part being reserved for the construction of the joint. In other types of construction, the ends of the pipe wall are provided with heavy metal rings. The elastic and plastic deformations caused by the prestress in the pipe wall will be counteracted by the non-prestressed ends, thus creating secondary bending moments and shearing stresses which become more critical as the prestress and diameter of the pipe increase.

According to the article, the consequences of a discontinuity in the pipe construction can be avoided by continuing the spiral wires as near as possible to the end of the pipe, or by providing an effectual longitudinal prestress.

In the second solution, it was said that it is essential that the total prestress distributed over the full section must be available at a distance of 8-10 in. from the end of the pipe, which means that special attention must be paid to the anchorage of the longitudinal wires. The anchorage length by bond to the concrete is sometimes estimated at $60d$ (where d=wire diameter), but due to high stresses around bars, a considerable local creep can be expected.

It was also stated that when the pipe is submitted to an internal water pressure, the secondary stresses will be reduced.

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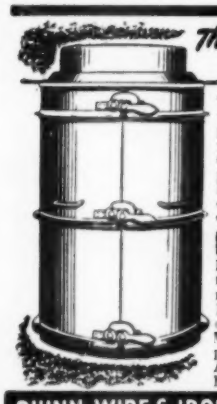

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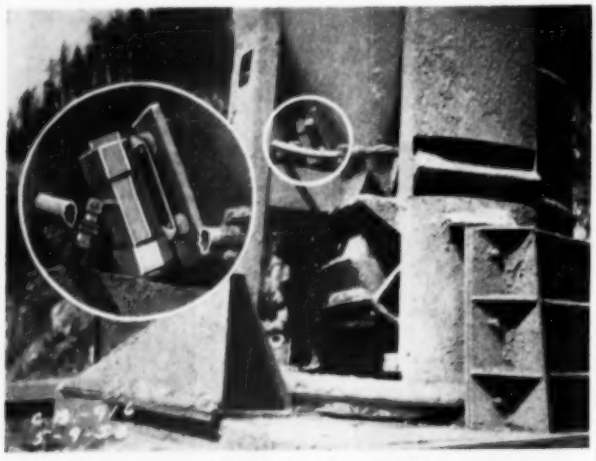

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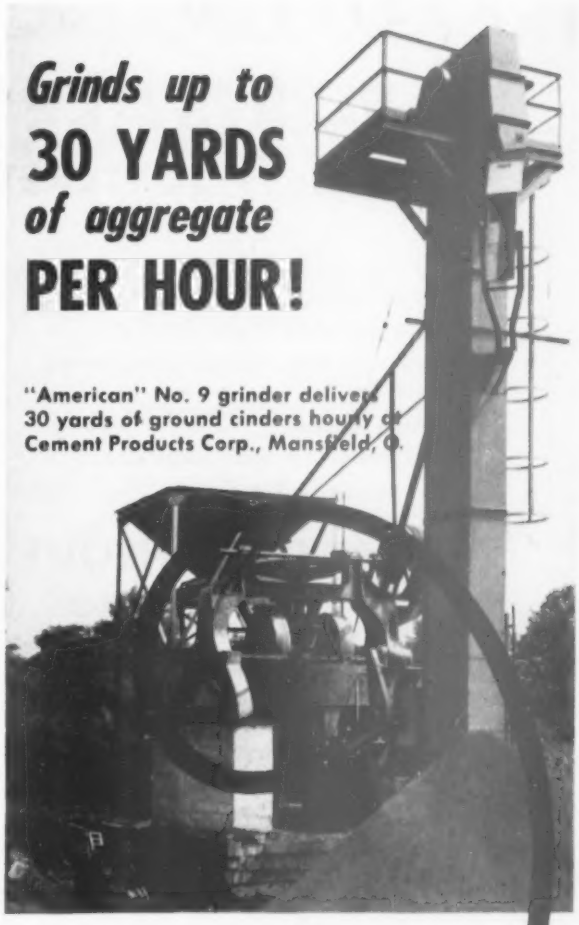

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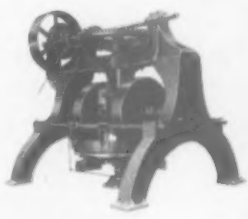

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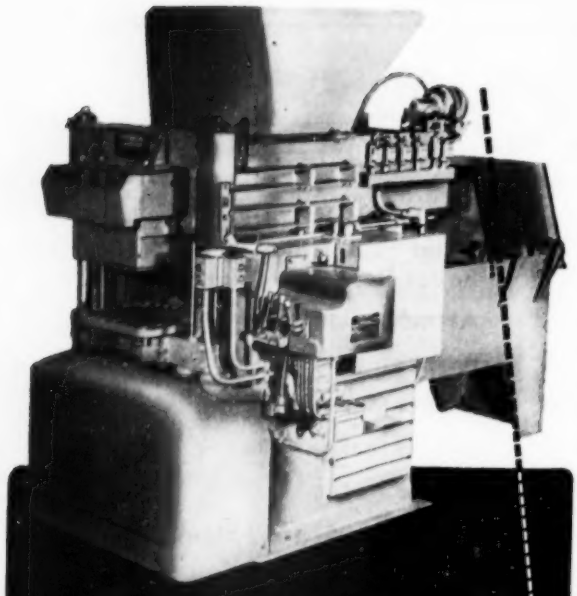

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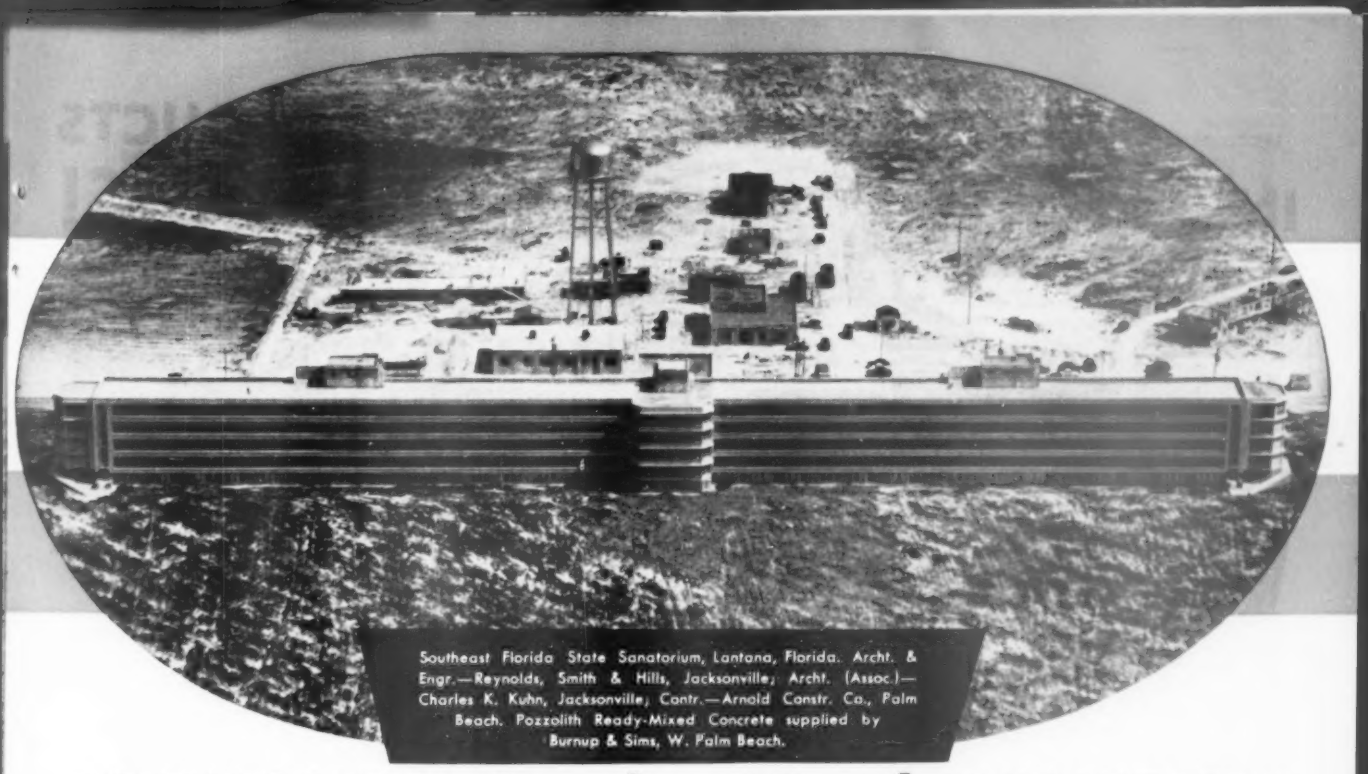


Southeast Florida State Sanatorium, Lantana, Florida. Archt. & Engr.—Reynolds, Smith & Hills, Jacksonville; Archt. (Assoc.)—Charles K. Kuhn, Jacksonville; Contr.—Arnold Constr. Co., Palm Beach. Pozzolith Ready-Mixed Concrete supplied by Burnup & Sims, W. Palm Beach.

POZZOLITH Ready-Mixed CONCRETE

In One Of Country's Finest Sanatoriums

This 508 patient tuberculosis hospital, designed in straight line to obtain maximum operating efficiency, is another of America's noteworthy structures built with Pozzolith Ready-Mixed Concrete.

Approximately 10,000,000 cubic yards of Pozzolith Concrete were placed in 1951. This wide use of Pozzolith Concrete results from the fact that builder, owner and ready-mix producer all benefit from its high standards of performance.

Among the important advantages obtained with Pozzolith Concrete are:

- EASIER PLACEABILITY — for lower placing costs
- MINIMIZED SEGREGATION — for better appearance
- REDUCED SHRINKAGE — for less cracking
- LOWER PERMEABILITY — for less "waterproofing" expense
- INCREASED BOND-TO-STEEL — for better construction
- GREATER DURABILITY — for longer life concrete

Pozzolith conforms with the water-cement ratio law — basis of ACI and ASTM procedures of design, specifications, and production.

Full information on request.

Over 600 Leading Ready-Mix Plants
Are Producing Pozzolith Ready-Mixed Concrete

Over 600 Leading Ready-Mixed Plants are now equipped with the POZZOLITH AUTOMATIC DISPENSER

WHY?

Because a producer can, at lower cost:

1. Produce concrete of low permeability . . . with normal Portland cement.
2. Produce high-early strength concrete . . . with normal Portland cement.
3. Produce air entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement — stepping up production, reducing inconvenience in handling and cutting costs.

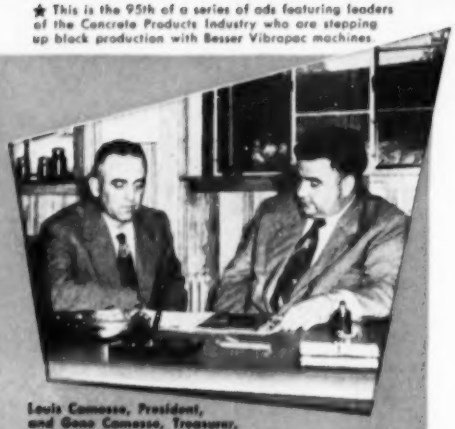
In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than by any other means.

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

Another Leader★ IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

★ This is the 95th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines



Louis Camosso, President, and Gene Camosso, Treasurer, of Camosso Brothers, Inc.

Section of the Camosso plant at Auburn, Mass.

One of the Besser Vibrapacs at the Camosso plant. Produces three 7⅝ x 7⅝ x 15⅝ units (or equivalent in other sizes) at a time on one Plain Pallet.

One of the 125 small homes in the Griggs' development. Concrete block supplied by Camosso.

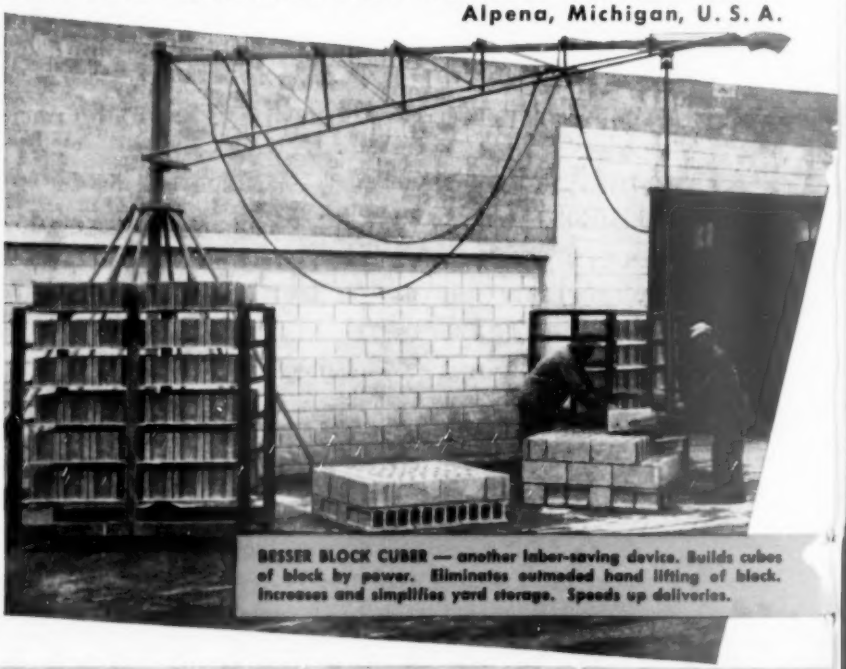
"Besser Equipment is Dependable and Has Given Us Full Satisfaction"... Gene Camosse

Now operating two Besser Vibrapacs in their Auburn, Massachusetts plant, the Camosse Brothers describe their experience as follows:

1. "We have no costly downtime as our Vibrapacs give us continuous, uninterrupted production."
2. "Our Vibrapacs produce a uniform dimensioned, high-quality block with pleasing texture."
3. "Greater acceptance of concrete block has developed due to the ease with which our Vibrapacs make the many styles and sizes needed in today's building."
4. "Lower operating cost plus higher production has kept the selling price down and increased our profits."
5. "Our company owes to Besser Equipment and the Besser Organization a large measure of our success."

Besser Vibrapacs will do for you what they have done for the Camosse Brothers. Why not investigate? Contact your Besser representative for full information on the latest Besser Vibrapac and how it can assure you success in the concrete products business.

BESSER MANUFACTURING COMPANY
Alpena, Michigan, U. S. A.



BESSER BLOCK CUBER — another labor-saving device. Builds cubes of block by power. Eliminates outmoded hand lifting of block. Increases and simplifies yard storage. Speeds up deliveries.

BESSER

BATCH MIXERS | SKIP LOADERS | BLOCK & BRICK CUBERS | SUPER VIBRAPAC | SINTERING PLANTS | ACROW CENTERS | ROOF TILE MACHINE

LIQUIDATION

COWELL PORTLAND CEMENT CO.

COWELL (25 MILES FROM SAN FRANCISCO) CALIF.

$12,000,000.00 VALUATION

TUBE MILLS BALL MILLS WELL DRILLS GYRATORY CRUSHERS ROCK DRYERS HAMMER MILLS CLINKER COOLERS KILNS, SCALES PUMPS, TANKS ETC.	SCALPER SCREENS HUMMER SCREENS TRIPPERS COMPRESSORS ROTATORS RUBBER BELTS CONVEYORS STEAM BOILERS DUST COLLECTORS ETC.	POWER SHOVELS BUCKET ELEVATORS SCREW CONVEYORS LOCOMOTIVES TANK CARS MINE CARS RAIL TRUCKS MACHINE SHOP MOTORS, SUPPLIES ETC.

27 CORRUGATED IRON BUILDINGS—Covering approximately 250,000 sq. ft.

THIS IS ONE OF THE LARGEST FULLY EQUIPPED PLANTS ON THE WEST COAST.

DAILY CAPACITY 4000 BBLS.

THIS PLANT CAN BE PURCHASED IN ITS ENTIRETY OR PARTS THEREOF
EXCELLENT LOADING FACILITIES
R.R. SPUR TRACK ON PREMISES

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ARRANGEMENTS FOR INSPECTION CAN BE MADE BY CONTACTING

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1—Dorr Classifier — Type DSFXB, Serial No. US 13012 with 22 ft. dia. bowl and 8 ft. x 39 ft. rake

• • • • • • • • • • •

1—Sand Dryer — 43" dia. x 14' with drive and burner. 1½ tons dry sand per hour.
1—Lot new heavy screen cloth, various sizes.
3—Pumps, 40, 60, and 75 HP.
12—Electric Motors — 2 HP to 50 HP.
19—Transformers, 5 to 1000 KVA.

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Mount Morris, N. Y.
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GUARANTEED MOTORS
M.G. SETS • GENERATORS
Hoists • Compressors • Transformers
Units of Every Size and Description
WE'LL SELL, BUY OR TRADE

CHICAGO *Electric Co.*
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CHICAGO 8, ILL.

FOR SALE

2—EUCLID, Model 9 FDT Tractors with 58 W Bottom Dump Trailers — CUMMINS DIESELS, Excellent Condition, and Excellent Rubber.

2—LINK-BELT 20' x 6' REVOLVING SCREENS

WINTER BROTHERS MATERIAL CO., INC.
VI 3-4052 Sappington 23, Missouri

RAILS NEW AND RELAYING
TRACK ACCESSORIES
"FASTER FROM FOSTER"
Try us for all of your rail needs. We're buying daily — replenishing our stocks in all sizes. Complete stocks of All Track Tools & Accessories.

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L.B. FOSTER CO.
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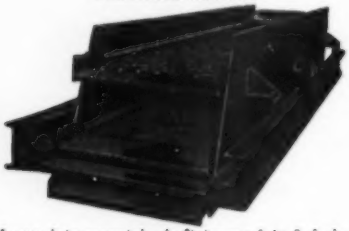
PICK YOUR MACHINE AND HAUL IT AWAY!

Guaranteed Equipment—Immediate Shipment

Write—phone—wire in advance. Almost everything in stock and ready to go.

VIBRATING SCREENS



Heavy duty eccentric-shaft types; 1 to 5 decks, 3'x8' to 5'x14'. Others from 2'x4'. Wire cloth or plate included to your specifications.

Priced from $431.00

CINDER, PUMICE, PERLITE CRUSHERS

10 to 20 tons per hour capacity	$ 479.00
25 to 50 tons per hour capacity	1144.00
50 to 100 tons per hour capacity	1483.00

Complete with hoppers.

PAN AND RECIPROCATING FEEDERS

Complete with motor and drive. 15 to 225 tons per hour capacity.

Priced from $423.00

TRUCK SCALES

20 Ton Truck Scales	$617.00
26 Ton Truck Scales	684.00
33 Ton Truck Scales	895.00

Others to 50 ton capacity. All scales complete with structural steel. Parts and weighing beams for most makes of motor truck scales.

BUILD YOUR OWN CONVEYORS AND BELT FEEDERS

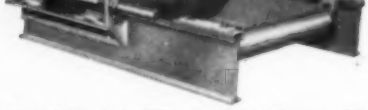
3-roll Troughing Idlers for these sizes:

14" belt	$16.50	24" belt	$22.50
16" belt	17.25	30" belt	23.60
18" belt	21.60	36" belt	26.00
42" belt	$29.75		

1-roll Return Idlers for these sizes:

14" belt	$ 6.38	30" belt	$10.00
16" belt	6.75	36" belt	11.00
24" belt	8.75	42" belt	12.00
48" belt	$13.00		

HEAD AND TAKEUP PULLEYS



All welded steel. With or without frames. All sizes. Head pulleys in frame from $154.00. Takeup pulleys in frame from $189.00.

WRITE FOR CATALOG & PRICES OF NEW EQUIPMENT. ALSO LIST OF GUARANTEED BARGAINS.

BONDED SCALE AND MACHINE COMPANY

128 Bellview **Columbus 7, Ohio**

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Penna. SXT-8 hammermill with 125 HP slip ring motor & controller.

14" x 24" double roll smooth crusher.

Coal crushers, double and single rolls.

Double roll cinder crusher, 12" dia. x 16".

Universal laboratory 6" x 4" jaw crusher.

Merrick scale for 30" belt conveyor.

Magnetic 18" belt feeder, 15' long.

95' elevator, 16" bucket on C111 chain.

Enclosed 80', 12" malleable buckets on C102H chain.

60' on chain with 14 x 6" x 7¾" buckets.

Enclosed 60; 10" buckets on C102H chain.

Inclined steel frame, 844 chain cont., 50' bucket elevator.

Cont. 20" buckets on 8-ply belt, 70' center.

New 14" and 18" trough belt conveyors.

42" belt conveyor equipment for 200'.

36" belt conveyor equipment for 400'.

30" belt conveyor equipment for 400'.

20" flat belt conveyor up to 300'.

New & used conveyor belt up to 36".

12", 14", 16" & 21" elevator belt.

L-B apron conveyor, 24" x 46', ¼" overlapping plates.

Gear reducers and gear motors.

Motors, engines, gears, sprockets.

Jeffrey-Traylor type 2-A vibrating feeders.

Ten single and double deck vibrating screens.

Approx. 50,000' elevator and drive chain.

Three electric overhead hoists.

Chicago Pneumatic #12 air hoist, 3 ton.

Elevators and conveyors built to order.

Sullivan HE-7L single drum 7½ HP elect. hoist.

Stimmel Winches 1½ HP, 110 Volts.

Ideal Power Triplex 7' lawn mower.

Jaw crushers, pumps, hoists.

G. A. Unverzagt & Sons

136 Coit St., Irvington, N. J.

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20 — 36 Ball Bearing Universal Jaw Crusher
10 — 24 Ball Bearing Universal Jaw Crusher
9 — 36 Ball Bearing Telsmith Jaw Crusher
10 — 56 Ball Bearing Telsmith Jaw Crusher
14 x 26 Acme Jaw Crusher
32 and 40 Telsmith Gyratory Crusher
3' Symons Cone Crusher
75 — 100 — 200 H.P. Motors
16" x 16" New Holland Rolls
36" x 15' Cedar Rapids Sand Drag
½ yd. General Shovel and Crane on Rubber, 1946
36" x 12' Telsmith Feeder

BLUE BALL MACHINE WORKS

Blue Ball, Penna.

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SAND AND GRAVEL BUSINESS

located

SUBURBAN NEW YORK CITY

Complete Sand Plant in full operation and Real Estate, including one million yard gravel bank.

Owner Retiring.

$110,000. Cash $35,000

For full particulars write

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1 24"x72' Channel Frame Conveyor with 7½ hp motor and reduction gear.

1 Robbins Gyrex 48"x102" Screen with motor, Model C-9, being used as scalping screen, can be converted to 2 deck.

1 New Holland 8'x8' 30" Apron Feeder, Complete with motor.

1 36"x12' Channel Frame picking belt, with motor and reduction gear.

1 Standard Cemco 23 cy Straight Leg Bin.

1 TE 25 hr, 1150 RPM Diehl Motor 220-60-3 phase with base rails and v belt pulley 8 groove.

1 20T Standard 9' x 20' Platform Scale.

All necessary Magnetic Switches, fuse boxes, etc., to install the above using 220-60-3 phase circuit.

1 3 M-Barnes pump (new)

STEELTON SLAG COMPANY
P. O. BOX - - - 405
STEELTON, PENNA.

IMMEDIATE SHIPMENT

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NEW
RELAYING

SWITCH MATERIAL

ALL TRACK ACCESSORIES

MIDWEST STEEL CORPORATION

CHARLESTON 21, W. VA.

Chgo. Pneu #15 Diamond Core Drill
54" Hyd. Balanced Plunger Valve
30"x8', 3x12' & 40"x6' Apron FEEDERS
1½ to 3 yd. Transit Mixers, many makes.
315 to 1232 CFM Air Compressors, all types.
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CRUSHERS: 10x20 Univ. 15x36 Diamond, 10x40 Good Roads, 18x24 Univ. 20x36 Cedar Rapids, 48x36 Farrell JAW. #7 Newhouse, #25 Kennedy GYR. 24x16 & 54x24 DBL ROLL. Port & Staty. Crushing Plants.
MILLS: Williams 4 & 5. Gruendler 2XC, 3XB. #3 Univ. #22 Gilson Hammer. Raymond 4 & 5 Roll. 6x6 & 6x8 Ball. 5½x22 Tube.
NW2, 6, 8 & 25. Link Belt K370. Lima 802. Monighan 3T, P&H 1055 DRAGLINES.
SHOVELS: Koehring 205, Link Belt LS75, Buckeye 70, 1 yd. Byers, BW6, Lorain 77 & 79. Lima 604. Bucyrus 52 & 54B. NW 78 & 80D. Lima 1201. Marion 40A. Bucyrus 80B. E.ec.
Repres: Bonded Scale & Machine Co.
Thurman Machine Co.
MID-CONTINENT EQUIPMENT CO. INC.
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FOR SALE

One Marion Dragline, Type 360, All Electric, with 158' boom and 9½ Cu. Yd. Bucket. Particulars upon request.

AMERICAN CYANAMID CO.
Brewster, Florida

DEPENDABLE USED MACHINES

Special, — Quickway comb. shovel and dragline on half track, new in 1948.

Lorain 40 shovel	20"x40' port. belt conveyor	New 3x10 screen
P&H ½ yd. crane	Morris 10" manganese gravel pump	12x12 revolving screen
Hanson truck crane	Robins 20" belt tripper	Eagle cinder crusher
Lessman loader	Gruendler 10x36 r.b. crusher	New 18"x100' conveyor
3 yd. Dumpcrete	Cedar Rapids 15x36 crusher	Waukesha 6MZR engine

These machines reconditioned in our newly-built daylight plant. Come see them!

10030 Southwest Highway **TRACTOR & EQUIPMENT CO.** **Oak Lawn, Ill.**

ALSO SEE READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT CLASSIFIED ADVERTISING IN CONCRETE PRODUCTS SECTION

CRUSHERS: Gyratory 30", 36", 42", and 48". Nos. 12, 10, 9, 7½, 6, 5 Allis-Chal. and others. JAW TYPE: 24x36, 25x40, 28x36, 40x48, etc. CONE TY: Symons 2, 3, 4 and 5½'. No. 36 Telsmith. Also Kennedy 19, 25, 37 and 49. Traylor 1'8" and 2'4" TY. Newhouse 7, 10 and 14". Steadman 24, 30 and 36" Impact. Allis-Chalmers Ty. R.
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MILLS: Hardinge 3'x8", 6'x22", 6'x3' and 8'x4'. Kennedy 4x8, 5x6, 5x11. Marcy 4x5, 6x4, 7x16. Raymonds, Sturtevants and others.
CRUSHING PLANTS: 24x36, 25x40, 30x42 and smaller. Also complete stationary plants.
DRYERS: 90"x60', 7'x50', 10'x90', 8'x50'. Etc.
SCREENING PLANT: Large modern plant new in 1946, priced at ⅛ original cost.
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BINS & BATCHERS: 20 yd. capacity & larger.

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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kiln, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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Albert RINGS THE BELL

PIPE — Small and Large Diameter, from our Stock

Welded
Seamless
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Supplies of Fittings
Valves and Tube Turns
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SPEED-LAY Pipe System
Quick Assembly
Economical, Light Weight
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PIPE SUPPLY CO., INC.
Berry at North 13th Sts., Brooklyn 11, N. Y.
Phone EVergreen 7-8100

1—No. 1 Raymond Mill.
Nos. 9, 8, 7½ and 6K Allis-Chalmers gyratory crushers.
1—6' Raymond Whizzer separator.
1—36"x16" Sturtevant crushing rolls.
1—42"x16" and 12"x12½" Allis-Chalmers crushing rolls.
1—24"x14" Rogers Crushing Rolls.
1—500 barrel cement plant.
5' x 50' x ½" dryer. 1—8' x 80' kiln.
New and Rebuilt Dryers—Kilns and Coolers.

W. P. HEINEKEN, INC.
50 Broad St., N. Y. Tel. Wh. 4-4236

FOR SALE

1 Haiss Loader. Model 77 C on cat tread with shaker screen attachment.

GEO. F. WEAVER, R. R. 2
Vandalia, Ill.

FOR SALE

Bucyrus-Erie 22-B No. 52226 Shovel—Condition Excellent—Cat-Diesel—5600 hours service.
Bucyrus-Erie 22-B No. 59796 Shovel—Buda Gas—Condition Excellent—5600 hours service—also new Cat-D-318 power Unit for same.
Cat-D-7 Tractor with Angle Dozer—PCU—New Cats—Idlers—Motor overhaul—Excellent Condition—5000 hours service.

TATRO BROTHERS SLATE CO., INC.
Middle Granville, N. Y.

TRUCKS: 10 — End dump, 1947, model FC2C, 30 ton, Mack, 300 H.P. diesel motors.

SHOVEL: Bucyrus Erie 37-B, Caterpillar D13000 diesel, 1½ yd. capacity. Shovel Front for 37-B Bucyrus Erie.

LOCOMOTIVE CRANE: Link Belt, bucket operating, gasoline powered, standard railroad gauge.

GYRATORY CRUSHER: Allis-Chalmers 10-K.

CRUSHERS, JAW: Sizes 12" x 15" to 48" x 60".

COMPRESSORS: Worthington DC2, 29/18½x21, motor 600 H.P. synchronous, 440 volt, with all auxiliary equipment. 4—Ingersoll Rand Diesel portable, 500 cu. ft. @ 100 lbs. pressure. NEW 1951.

DIESEL MOTOR: Caterpillar D13000 portable on skids, 122 H.P.

DRYERS OR KILNS: 2—10'x90' heavy duty, with or without auxiliary equipment, condition like NEW. Located Minnesota. 1—Kiln 4 ft. dia. x 65 ft., complete with all equipment, oil fired, like NEW. 2— Kilns 7'6"x125 with Fuller Lehigh grate type coolers 3'6"x16' with or without all auxiliary equipment.

TRUCK CRANE: Northwest, 40' boom, 1 yd. clamshell, mounted on Mack 6 cyl. chassis.

AIR SEPARATOR: 1—Bradley 16 ft. with or without 100 H.P. 440 volt motor, 880 RPM, type C1, variable speed, 3 phase, 60 cycle; Wound Rotor 300 volts, 222 amps.

PULVERIZERS: Hardinge 5'x22", steel lined. Ball Mill, complete with disc feeder and 30 H.P. motor. Marcy 8'x12' Rod Mill, double end, center discharge 500 H.P. motor. 2— 5'x14 ft. Marcy open end Rod Mills, center discharge.

CLASSIFIERS: 4—Akins and Wemco 54" and 78", single screw, double pitch, weir type, 220/440 volt motors, all in new condition. Two of the above located near Reno, Nevada. 1—Dorr 8'x39' rake, with 22' bowl. New condition.

BOOT BUCKET ELEVATORS: 2—Fully enclosed Chain Bucket Elevators 24"x48" x40' centers, bucket 9"x12"x7" deep, links 2½"x4", bucket to bucket center 16", with 10 H.P. motors and speed reducers, 220/440 volt, A.C.

A. J. O'NEILL
LANSDOWNE, PA.
Phila. Phones: MAdison 3-8300—3-8301

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Insley "K-14" ¾ yd. Dragline, Reconditioned
Insley "K-12" **Used** ½ yd. Dragline
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Insley "K-10" **Used** ⅜ yd. Shovel
Bantam **Used** Drag & Hoe, on GMC 6x6

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Rex 3 yd. **Used** Hi-Discharge Moto-Mixer
Rex "27E" Paver. Big Drum. Reduced to $2250.00.

MISCELLANEOUS

Martin "333" 10-Ton Tag-A-Long Tilt-Top Trailer, slightly used.
Schramm "60" **Used** Portable Compressor
Universal Port. Pulverizer Plant: #5 Pulverizer, Murphy "ME-66" diesel power, plate feeder, 4 x 8 screen, etc. Pneumatics.
Cummins Diesel — Electric Plant, 50 KW, Priced right.

EIGHMY EQUIPMENT COMPANY
120 S. Pierpont Rockford, Illinois

YOU PROFIT WHEN YOU BUY FROM A LONG ESTABLISHED COMPANY

35 Years of Service

PULVERIZERS:

2—#5047 Raymond High Side, 4 rolls, one mill equipped with "whizzer" type air classifier; both mills equipped with Raymond exhausters, cyclones and inter-connecting piping.
6—No. 1, #0, 00, 000 Raymond.
3—#0, 00, and 8" Raymond Screen Mills.
4—Mikro #2SI, 2TH, 4TH.

BALL AND TUBE MILLS:

1—4'6" x 7' Ball Mill, Allis-Chalmers, iron lined, used 100 hours.
4—Tube Grinding Mills, made by Traylor E. & M. Co., Allentown, Pa. Silex lined. 4' x 13', 4'6" x 18'6", 4' x 22' and 5 x 20'. Also two 5'6 x 20' iron lined, with motors.
8—Pebble Mills, porcelain lined; 3—6' dia. x 8', 800 gals. each. 1—6' x 5'; 3—5' x 4', each with ball charge.

ROTARY KILNS:

3—6' x 60' Vulcan Iron Works, complete; each with or without 3' x 50' Rotary Cooler. By installing lifting flights these kilns would make excellent heavy duty dryers.
1—7' x 45' Link Belt Kiln, complete; 1—7' x 120' Vulcan Iron Works; 1—8' x 135' Allis-Chalmers.

ROTARY DRYERS:

4—Ruggles-Coles Direct Heat: Class XA2—4' x 20'; Class XF4—54" x 25';
2—Class XF 5' x 40';
3—5' x 30', 6' x 40', 6' x 60'.
1—Louisville 6' x 50' Rotary Steam Tube Dryer; also 6' x 27' Louisville, with 42 S/S tubes.
1—7' x 70' Louisville, Type L, direct heat.

VIBRATING SCREENS:

4—Unused 6' x 14', 2-deck, Allis Chalmers "Ripl-Flo" type.
3—Selectro 3' x 6' 2-deck, 1—3' x 6' 1-deck, all totally enclosed, heavy duty.
1—3' x 6' Colorado Iron Works, 1-deck.
1—4' x 8' Tyler Niagara, 3 decks.
8—Tyler Hummer, 3' x 5', 4 x 5', 4 x 10'.

AIR SEPARATORS:

2—Raymond 6' and 16' dia., 1—8' Gayco; 1—16' Sturtevant.

CRUSHING ROLLS:

1—42" x 16' Allis-Chalmers, Type B
1—24" x 15" Sturtevant, balanced type
1—24" x 32" Penna. Single Roll, with motor.

DORR CLASSIFIERS:

2—7' x 30' Dorr Twin Rake Classifiers
2—Two stage Washing Classifiers, each with two rakes in tandem, in steel trough 26' x 6" long x 3' wide, with drives.
1—6' x 14' Hardinge Rotary Counter Current Classifier, also used for dewatering and scrubbing.

Also Shovels, Cranes, draglines; Jaw, Gyratory and other crushers; Symons and Telsmith Cones; Complete Portable Crushing Plants; Rotary Kilns and Coolers; Air Compressors; Conveyors; etc.

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Complete stone quarry fully equipped, and in operation a good fleet of delivery trucks, ample supply of stone for continuous operation. Excellent existing and future market. Owner retiring to devote full time to other business interests.

Russell Prall

Rush County Stone Co., Inc.

Route 1 **Phone 263-5** **Milroy, Ind.**

1—25-Ton Link-Belt HC-90 Truck Crane
1—255-A P&H Truck Crane
1—20-Ton Bay City Truck Crane
1—⅜ Yd. Lima Diesel Shovel
1—1¼ Yd. Bay City Model 65 Diesel Shovel
1—2 Yd. Koehring 803 Crane
2—45-Ton GE and Plymouth Diesel Electric Locomotives
1—30-Ton Davenport Diesel Locomotive
1—40-Ton Industrial Brownhoist Oil Fired Loco. Crane — New 1943
2—Nos. 6 and 80-D Northwest Shovels
1—Northwest 25 Shovel Attachment
1—45' Crane Boom for Link-Belt LS-90

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Girard Trust Co. Bldg., Phila. 2, Pa.
Rittenhouse 6-2311

FOR SALE

3—Euclids, 15 Ton, Rear Dump, Model 81FD, Cummins Diesel, Quarry Type Body, Fuller 5F-1220 Transmission, 1300X24 18-Ply Front, 1400X24 20Ply Rear. Used only short time. Guaranteed 45 days. Subject to prior sale — $16,500.00 — each. All or none.

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Atlanta, Georgia

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1 Fairbanks Morse & Company Diesel Generating Unit 210 hp. 3 cyl. Pr. Unit with 135.7 KWH Generator 3 phase 60 cy. 300 RPM. 7½ KW belt driven exciter, 1 — 200 Amp. oil Braker Switch, 2 — 40 x 5 Current Transformers, 2 sets of switches for D.C., 1 D.C. Rheostat. Must sell to make room for larger unit. Make us an offer.

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Never used. 110 ft. #830 Taylor-Wharton chain with F-2att. every second link.

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Tractor Dozer, Caterpillar Diesel 40, with La Plant-Choate angle dozer. Excellent condition, looks like new. $4000.00 or will consider trade on good rubber tire truck crane. Sheridan-Marquette Welding Service, 800 West Marquette Street, Ottawa, Illinois.

FOR SALE

15-YARD ELECTRIC WALKING DRAGLINE.

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Five Bucyrus-Erie 29-T drills, 440 v., 3 phase, 60 cycle, electric power, complete with tools and a stock of spare parts. Also one Bucyrus-Erie No. 12 bit dresser. Location: Sahara Coal Co., Inc., 59 E. Van Buren, Chicago 5, Illinois.

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8-K Gyratory Crusher with extra main shaft — new concaves and head.

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TWO—7½-ft. by 260-ft. Heavy duty Rotary Kilns, complete and including fire brick lining, all in excellent condition.

Available for immediate shipment.

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All kinds & sizes, including treated. Our SPECIALTY — #1's & Rejects Hardwood. Stocks both east & west of Miss. river.

Everything in Southern Lumber

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Box 55, Hot Springs, Ark.

BIT DRESSING MACHINE Modern machine dresses bit complete one heat without turning or touching with hands. For complete information write to A. W. Mutchhart, 303 W. Market, Tiffin, O.

New Boom and Dipper Stick For Sale

Fits Marion models 352 and 362
Boom 21 ft. long—Stick 16 ft.
Price $1,000
LYNN SAND & STONE COMPANY
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FOR SALE

Profitable, going limestone crushing business for sale. Excellent supply high grade stone available. Midwest location. BOX L-2, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

FOR SALE

Complete dipping plant, consisting of one 95 ft. steel mast, two ¾ yard buckets, hoist, track line cable and all other cables is as good as new.

L. C. Ilgen Gravel Co., Versailles, Ohio

FOR SALE

9 x 28 Wheeling P. B. Jaw Crusher, new jaws & toggle plate — excellent condition. Price F.O.B. $500.00.
15 x 29 Austin Western R. B. Jaw Crusher. Like new. Price F.O.B. $1200.00.
K. B. 7 International truck 1946 model with all steel low built bed. Used for hauling T. D. 9 dozer or ditching machine. Price $750.00.

C. F. POEPPELMAN, SAND & GRAVEL
Versailles, Ohio **Phone 5644-4**

FOR SALE

6 x 8 Gruendler Hammermill
(Extra hammers, grates, & sheaves)
General Bucket Loader on Crawlers

Priced to Sell

HUELSMANN QUARRY INC., Carlyle, Ill.

FOR SALE

1—30"x36" Traylor Type M Crusher
1—36"x60'0" Belt Conveyor with 10 HP Electric Motor
1—24"x60'0" Belt Conveyor with 7½ HP Electric Motor
1—48"x8'0" Symons Rod Deck Screen with 7½ HP Electric Motor

Location—Southern California

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Sand and Gravel Business for Sale with 27 acre pit 50 miles west of Chicago now in operation with complete wash plant, high bank of material and 65% of pit is high grade Mason Sand. BOX K-96, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Illinois.

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Pioneer Portable Gravel Plant. Now operating. Good Condition. Capacity — 60 ton per hour. Price $6,000.00. V. H. Callender, Pittsfield, Illinois. Phone 448R.

FOR SALE

Scoopmobile End Loader, Motor like new. Price $1700.00
Buda Motor—6B230—Power Plant
Price $400.00
All in Excellent Condition.

Earl W. Beebe, 302 E — 2nd Street, Prophetstown, Ill.
Phone 357 — Prophetstown

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Complete Sand, Gravel and Excavating Business for sale. Washed sand and gravel. Also pit run. Excellent business the year around and a good money maker. All machinery in A-1 shape. Death in family forces sale of this business. A. H. Bodelson Realty Company, Fulda, Minnesota.

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Motors and Generators, Control and Repair Parts. Large Stock. New and Rebuilt. Guaranteed Expert Repair Service. Send us your inquiries.

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30 x 18 Pioneer with 2 new plain roll shells — excellent condition. $2,950.00.

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15" x 36" Diamond Roller Bearings 3' x 8' Cedarapids Apron Feeder mounted on steel supports — First Class. $7,250.00.

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40" x 18' Telsmith Heavy Duty used 60 days. $1,200.00.

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Entire Western Quarries Co. Purchased

Bargain Prices on all equipment. Send for detailed listing.

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6" x 3" to 60" x 48"

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Engineers and Manufacturers
Machine Shop Facilities
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Send for Catalogue

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While it lasts—Surplus new Pioneer belts any length up to 500 ft.

12 inch—6 ply 28 oz. duck 1/8 x 1/32 cover elevator belts. List $5.00; Price ..... $3.70 per ft.

20 inch—4 ply conveyor belt—28 oz.—1/8 x 1/32 cover. List $5.26; Price ..... $4.00 per ft.

24 inch—4 ply conveyor belt—28 oz.—1/8 x 1/32 cover. List $6.18; Price ..... $4.75 per ft.

24 inch—5 ply—conveyor belt—28 oz.—1/8 x 1/32 cover. List $7.24; Price ..... $5.45 per ft.

BAUGHMAN MANUFACTURING CO., INC.
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FOR SALE

1 Set 42" x 16" AA Traylor Heavy Duty Rolls. Weight—64,400 Pounds. Immediate Delivery.

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28 SURPLUS
NEW BELT CONVEYORS

30 INCH 1-136'—1-270'—2-350'—1-418'—2-500'—1-1100' & 2-1500' Long.
36 INCH 1-160'—2-250'—1-320'—1-400'—1-590'—2-1000' & 1-1600' Long.
42 INCH 1-144'—1-290'—1-377'—1-575'—2-700'—1-800'—2-1500' Long.

EXTRA IDLERS, TERMINALS & BELTS.

10 SURPLUS NEW
MERRICK E WEIGHTOMETERS
1 for 24 In. 8 for 30 or 36 In.
1 for 42 In. Belt

CLYDE HYDRATOR WITH KUNTZ CONTINUOUS DUSTLESS SYSTEM, 4-5 T.P.H.
NO. 1 RAYMOND AUTO PULVERIZER WITH THROWOUT, SEPARATOR & CYCLONE.
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NO. 4 CLYDE BATCH HYDRATOR.
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4 x 20 & 4 x 45
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65 TON G.E. DIESEL ELEC.
45 TON PLYMOUTH DIESEL.
10 TON DAVENPORT GAS.
20 TON WHITCOMB GAS.
70 TON PLYMOUTH PROPANE.
6 TON BROOKVILLE DIESEL.

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40 TON ORTON DIESEL.
30 TON INDUSTRIAL GAS.
20 TON ORTON GASOLENE.
25 TON INDUSTRIAL STEAM.

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24 x 36 FARRELL JAW CRUSHER.
42 x 48 SUPERIOR JAW CRUSHER.
18 x 36 FARRELL JAW CRUSHER.

THE DARIEN CORP.
60 E. 42nd St., N. Y. 17, N.Y.

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For Sale or Rent

1—Osgood, 1 yd. Crawler Hoe & Crane, 50' Boom, Gas Power. Good Condition.
1—Bay City Model 45 Crawler Hoe-Shovel, Gas power. Late model.
1—Marion Model 331, ¾ yd. Crawler mounted Shovel-Crane-Hoe, gasoline power. Completely rebuilt.
1—Buckeye Model 70, ¾ yd. Crawler Hoe & Shovel. Late model, Diesel power.
1—Lorain Model 40 Shovel, ¾ yd. Crawler Crane & Hoe, gasoline power, rebuilt.
1—Byers, Model 83, ¾ yd. Crawler Hoe or Crane, gasoline power. Rebuilt.
1—Bay City Model 25, ½ yd., crawler hoe-crane, gas powered. Excellent condition.
1—General, Heavy Duty, ½ yd. Crawler Shovel, Hoe or Crane, gasoline power. Rebuilt.
1—Insley Model K-12, ½ yd., 1946, Hoe, on 18" Crawlers. Powered by Buda Gas Engine. Excellent condition.
1—Bay City Tractor Shovel, Hoe or Crane, "Pup" ⅜ yd., ¾ swing, Crawler mounted, gasoline driven.
1—Browning Truck Crane, ¾ yd., 17½ ton capacity. Late Model. Excellent Condition.
1—Universal Truck Crane, 28 ft. Boom, mounted on A. C. Mack Chassis. Cheap.
1 P&H 255A Hoe Attachment.

Clamshell Buckets, ⅜ to 2 cu. yd., also several Crane Booms—Trench Hoes and Shovel Attachments—Assorted makes.

Check on what you may require.

EUGENE P. READING, INC.
Walnut St. & B. & O. R.R.
Roselle, New Jersey
Chestnut 5-0200 — New Jersey

FOR SALE

2—Buda 6 DT 468 Diesel Engines 75 H.P.—Operating Condition. $500 each, or both for $900.
2—Cotta Reduction Units for above 2 to 1 Red., one at $175.—one at $300.—both for $425.
1—I.H.C. UD-18 Diesel Engine direct conn. to Clarke 50 KW-AC Gen. — 220-440 volts—3 Ph.—60 Cyc. Good condition—complete $3,200.

Above equipment now in use but will be available about October 1, 1952.

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Box 1228 Phone 1324
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Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 5047
Pennsylvania C-4-30 Reversible Hammermill.
Cedar Rapids 4033 Hammermill. Diesel powered.
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36" x 48" Jaw Crusher.
Dixie No. 3640 Premier Non-clogging Hammermill.

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Morris 10" elec. with cutter. Steel hull—49'x9'x5'.
Ellicott 8" with cutter. Diesel Hull 48'x18'x3'6".
8" Hydraulic. Diesel. On 32'x8' steel pontoons.
Amsco 10" Diesel power portable. Excellent.
6" portable Diesel complete with cutters, etc.
8" H.P twin Diesel drive. Complete.

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B.K. P 4120 3 compts. agg. one for cement
Large plant 212 yd 6 compts. agg. & cement elevators. 56 S Mixer.
Large plant 400 yds 5 compts. two mixers
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Iowa Model 2A Crushing and Screening plant.
Cedar Rapids Model CCC 4024 plant. Diesel pow.
Pioneer 54-VA Port. with 12"x24" jaw crusher.
Telsmith Primary Port. 25"x36" jaw crusher Diesel
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾".

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40, Eagle 20x36, Diamond 24x36". Cedar Rapids 10x20, 20x36, 25x40, Farrell 10x20, 13x30, 14x36, 18x36, 36x48. Buchanan 36x42. Good Roads Reliance 15x30. Traylor 18x36, 24x36. Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1030, 1040, 1236, 1530.
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14". Newhouse, 24", 36". Gyrasphere, 18", 28". Intercone Telsmith, Telsmith 5H, 10-B, 13-B, 16 B. Kennedy Van Saun 7, 19, 25½-S, 37. Traylor Ty 1'8". Ty 2'4", T 4½".
ROLL: Allis Chalmers 54x24. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18". New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x33. Jeffrey 36x42, Jeffrey 36x24, 36x40. Dixie 3650.
BALL MILL: Allis-Chalmers 4'x4', 5'8"x18'. Kennedy Van Saun 7'x5'. New 4'x4'. Hardinge 6'x4'; Colorado Iron Works 5'x6', Marcy No. 64½. Hardinge conical 10'x36".
ROD MILL: March 2'x8', 3'x6'. Allis-Chalmers 4'x8'. Hardinge No. R 206. Marcy 8'x12'. Hardinge 8'x22".
CONE: Symons 2' coarse bowl, 4' standard coarse bowl.
TUBE MILL: Smith 16B 5'6"x20'. Denver 3'x8".
DRIERS: McNeil 5'x50'. Hardinge 30"x60'. Cummer 66"x50'. Perkins 8'x70', 10'x90'.

SHOVELS—CRANES—DRAGLINES

N-W 80-D 2½ yd. Dragline. Diesel. 100' boom.
N-W Model 6, 1⅛ yd. Diesel Shovel.
Lima Mod. 34, 1 yd. Shovel-Crane-Dragline. Gas.
Link-Belt K-375 2 yd. Diesel Dragline.
Northwest 80-D Diesel Shovel 2½ yd. Recond.
Link Belt K580 Shovel. 1948—practically new.
P&H Model 855, 2 yd. Diesel Shovel.
Bay City 45 Shovel-Backhoe-Crane. Diesel.
Lima 1201, 2½ yd. Diesel Shovel.
Lorain L80 Shovel. 1¾ yd. complete overhaul.
Link Belt K 595 dragline, 2½ yd., 8 ft. boom.
Lima 802, Shovel-Crane-Drag. 2 yd. Diesel.
Koehring ¾ yd. Diesel Shovel.

SCREENS AND FEEDERS

Symons 4'x10' 3 deck.
Diester 4'x10' 3 deck.
Tyler Hummer 3'x5' with motor generator.
Acme 5'x12' Revolv. Scrub-Scalp Screen.
Pioneer 4'x10' Scalping Screen. New 1946.
Robins 4x14 Vibrex Double Deck Screen.
Traylor Apron Feeder 5'x15', heavy duty.
Reciprocating Feeder 4'x19', with motor.

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Hough HA Payloader 12' bucket rebuilt.
Hough HE Payloader 13' bucket.
Hough HM Payloader 1½ yd. bucket.
Cat. D7 Traxcavator. Rebuilt.
Cat. D6 Traxcavator. Rebuilt.
Cat. D4 Traxcavator. Rebuilt.
Cat. D2 Tractor 50" Traxcavator. Rebuilt.

LOCOMOTIVES

45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
12 ton Plymouth gas loco. std. ga.
8 ton Plymouth gas loco. std. ga.
25 ton Vulcan steam std. ga. Side tank.
15 ton Whitcomb 36" ga. gas.
12 ton Whitcomb 36" ga. gas.

DERRICKS

American Terry 20 ton Guy Derrick 100' bm.
Clyde 30 ton stiff leg 90 ft. boom.
Guy Derrick 15 tons 115' mast 105' boom
American 25 ton stiff leg derrick 90' boom.
Special 35 ton stiff leg derrick 100' boom.
American Model 10-80, 20 ton Guy.
American 30 ton stiff leg 100' boom.

ASPHALT PLANTS

Butler 100 yd. Bitu. Concrete plant.
Cedarapids 60"x24" asphalt plant drier. Compl.
Madsen 4000# complete plant Diesel powered.
Model S-100 Simplicity. Diesel powered.
B-G 840-830 Maintenance Plant.
McCarter complete plant 3000# capacity.
Cedar Rapids Model FA portable plant.
Cummer Semi-Port. ¾ ton Pugmill.

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Sauerman slack line 1¼ yd.; electric 90' mast.
Sauerman 3 yd. cableway with 125 HP electric.
Sauerman 1½ yd. 70' mast. 150 HP Elec. Hoist.
Sauerman 1 yd. with Waukesha gas hoist.

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30 Church St. New York, N. Y.
Cortland 7-0723 Cable: RICHWALSH

QUALITY EQUIPMENT PRICED RIGHT

CONVEYORS

5" Fuller Kinyon, complete
Apron, 36"x34'
Screw, 6", 9", 12", 16".
Belt—All widths and lengths (write for complete listing.)

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Bartlett & Snow, 14"x16", 2 roll (unused).
Bartlett & Snow, 24"x24", single roll
Raymond #1 with feed conveyor & cyclone
24"x18" Jeffrey A2
14"x40" two-roll Traylor
18"x36" Jaw, Traylor, Bulldog
48" Symons vert. disc.
No. 222 Allis-Chalmers type R.
18"x24" single roll.

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Syntron, 12"x36".
Jeffrey, 18"x36".
Allis-Chalmers, 36"x72".
Fuller, 8" rotary (NEW).
Fuller, 12"x13".

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7'x125'x½".
10'x90'x9/16" Allis-Chalmers.
8'x80'x⅜" Vulcan.
7'x45'x½".
7'x60'x⅜" with lifters.
5'x67'x5/16" with lifters.
4'6"x40'x⅜".
5'x30' Ruggles Cole, indirect.
4'x35'x½" with burner.
5'6"x25' Allis-Chalmers, complete.

MILLS

Raymond 4 roll
5'x22', Smidth, Tube
Stedman, four cage
16"x40", three roll
Size 1, Allis-Chalmers
Williams No. 3
Williams GP-106
23"x12' double shaft, L.B. Pug.
10'x48" Hardinge.

SCREENS

4'x7' Tyler, single deck.
4'x10' Tyler, single deck (2).
4'x5' Tyler, single deck (2).

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2036 Cedarapids primary unit on rubber.
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4024 Cedarapids roll, rebuilt
3018 Cedarapids roll, rebuilt.
2025 jaw Cedarapids Rock-It plant, 3033 mill, new.
1236 Cedarapids Model 6C plant, new.
4033 Cedarapids hammermill, rebuilt.
1030 Good Roads, reconditioned.
10x7 Allis-Chalmers Blake type jaw crusher.
#1 Cedarapids Kubit impact breaker.
3' x 6' Kennedy Van Saun triple deck screen.
4' x 6' Kennedy Van Saun single deck screen.
15 cu. yd. Cedarapids sand drag, new.
16" x 90' bucket elevator.
60-ton, 2-compartment, 8'x18' storage bin with clamshell gates.
Special bins to your specifications.
Conveyors—18"—24"—30"—36". Also belt.

SHOVELS AND CRANES

Lorain L-820 Dragline. New 1951.
Lorain 77, 1½-yd. shovel, gas power.
Lorain 57, 1¼-yd. diesel. Excellent.
Lorain L-50, 1-yd. diesel. New condition.
Lorain 40 truck crane on Mack 10-wheeler. Reconditioned.
Osgood 1¾-yd. Model 900, diesel powered.
Unit 1020, ½ yard shovel, good condition.

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Sanderson-Cyclone No. 42 well drill, new.
Sanderson-Cyclone No. 44 well drill, new.
Bits—Stems—Bailers—Sockets, Etc.

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2—45" Ohio lifting magnets, rebuilt.
1—36" lifting magnet, rebuilt.

GENERATORS AND LIGHT PLANTS

1½ KW to 125 KW, alternating and direct current, gasoline and diesel powered.

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500 cu. ft. Gardner-Denver deisel, rebuilt.
105 cu. ft. Schramm gas powered on 4 steel wheels.
Worthington two-stage, water-cooled, vertical 250#, 60 CFM, new condition.

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Camp Hill, Pa.
Phone — Harrisburg 7-3431

FOR SALE

65 ton G. E. Diesel Elec. Loco.
7 Caterpillar DW10 Tractor-Wagons
30 Ton Amer. Steel Stiffleg Derrick
130 HP Christian 2d Diesel Hoist
30 Ton Ind. Bh. Gas Loco. Crane
30 Ton Davenport Diesel Loco.
1050 ft. I-R Air Compressor. New '49
48" Telsmith Gyrasphere Crusher
556 KW F-M Diesel Generator Set
10 Koppel 5 yd. Steel Dump Cars

Mississippi Valley Equipment Co.
513 Locust St. — St. Louis 1, Mo.

COMPLETE CRUSHING PLANTS

1—16V Pioneer Portable, 350 ton cap.
1—30" x 42" Austin Western Primary Diesel
1—10" x 36" Wood Secondary Diesel
1—15" x 36" Diamond Primary & Secondary
1—15" x 36" Farrel Elec. & 24" x 120' conveyor

DARIEN, 60 E. 42nd St., N.Y. 17, N.Y.

Equipment Values!

TRACTOR-DOZER — "Caterpillar" Diesel D4, serial #7J1111W, with nearly new "Cat" 4S hyd. Blade and hyd. control unit, Hyster D4N towing winch with cable, 16" shoes, crankcase guard, front pull hook. Wide ga. machine, just out of our shop. FOB Louisville. **$3975.00**

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SHOVEL FRONT Thew-Lorain ½ yd., for use with TL-15; 16' 6" boom, 14' 6" dipper stick. Cleaned, painted, ready to go. FOB Louisville. **$1250.00**

BUCKET LOADER Nelson Model K-5, serial #48927, powered by LeRoi engine and mounted on 6.50x16 front tires, 9.00x24 rear tires. Good operating condition. Cleaned, painted. FOB Louisville. **$3240.00**

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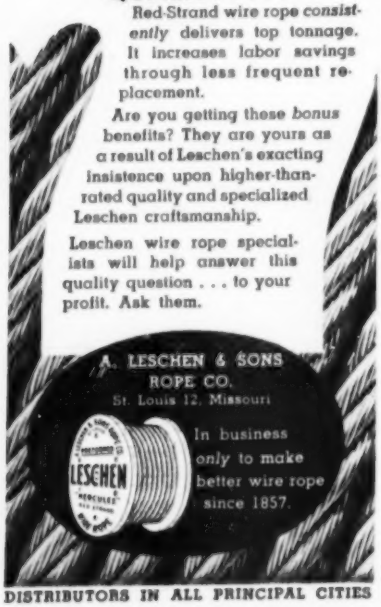

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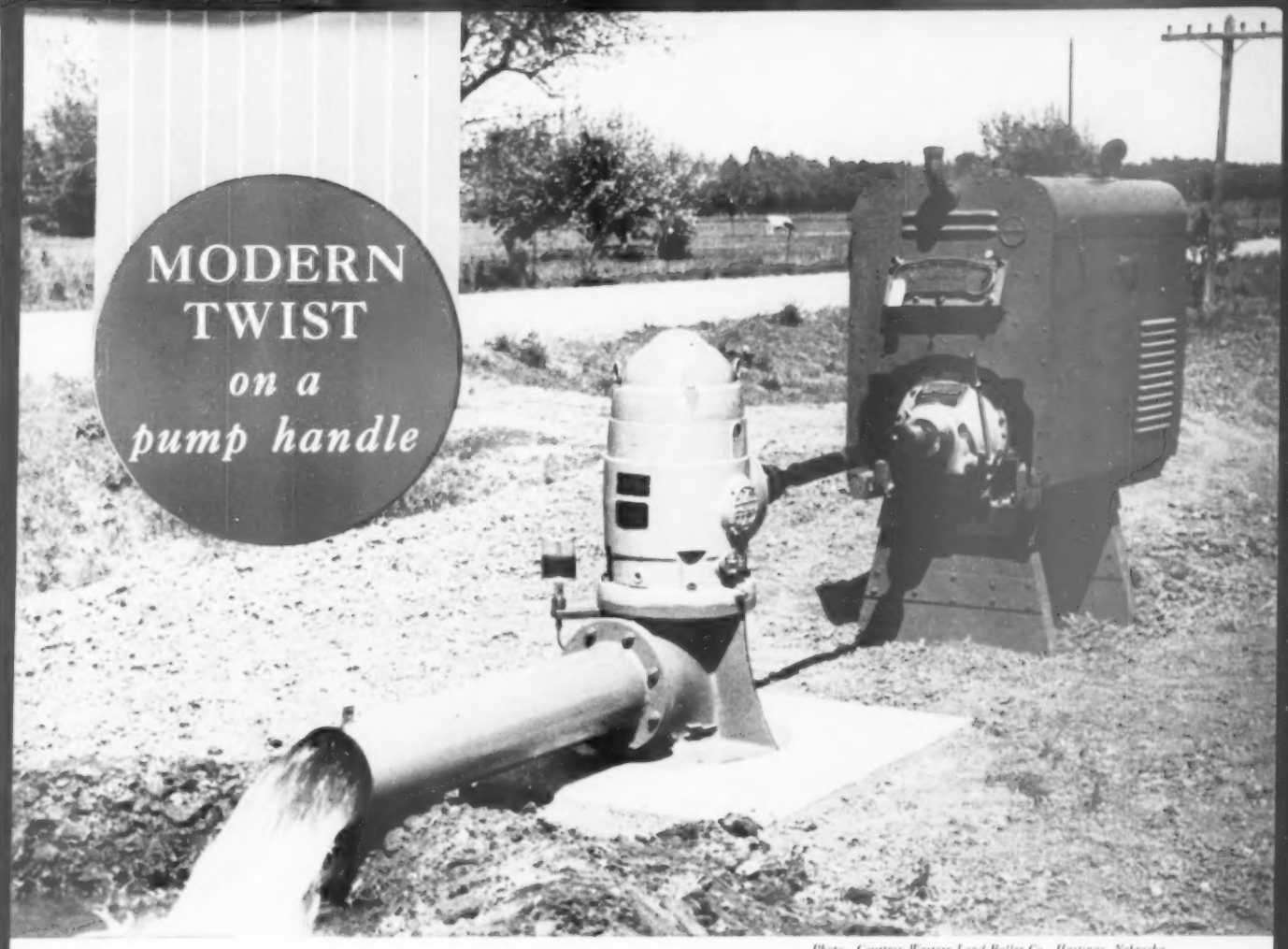
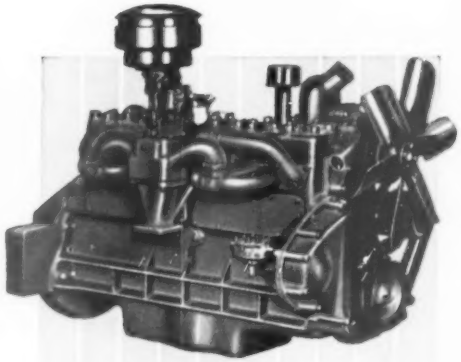


Photo—Courtesy Western Land Roller Co., Hastings, Nebraska

discharges 1050 gallons of water a minute from 100 feet down!



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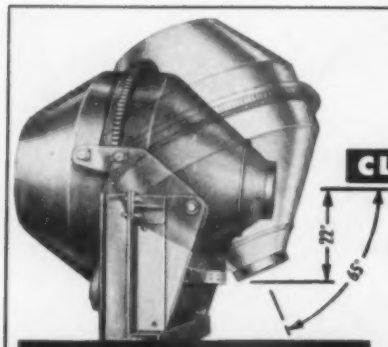

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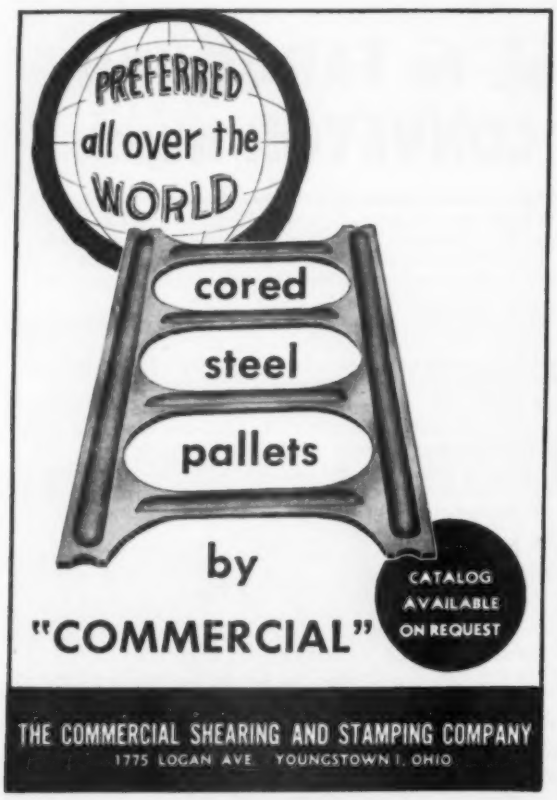
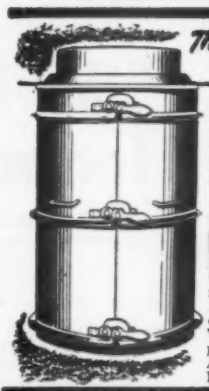
frequently terminated at a distance of 4-6 in. from the end of the pipe, with the remaining non-prestressed part being reserved for the construction of the joint. In other types of construction, the ends of the pipe wall are provided with heavy metal rings. The elastic and plastic deformations caused by the prestress in the pipe wall will be counteracted by the non-prestressed ends, thus creating secondary bending moments and shearing stresses which become more critical as the prestress and diameter of the pipe increase.

According to the article, the consequences of a discontinuity in the pipe construction can be avoided by continuing the spiral wires as near as possible to the end of the pipe, or by providing an effectual longitudinal prestress.

In the second solution, it was said that it is essential that the total prestress distributed over the full section must be available at a distance of 8-10 in. from the end of the pipe, which means that special attention must be paid to the anchorage of the longitudinal wires. The anchorage length by bond to the concrete is sometimes estimated at $60d$ (where d=wire diameter), but due to high stresses around bars, a considerable local creep can be expected.

It was also stated that when the pipe is submitted to an internal water pressure, the secondary stresses will be reduced.





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